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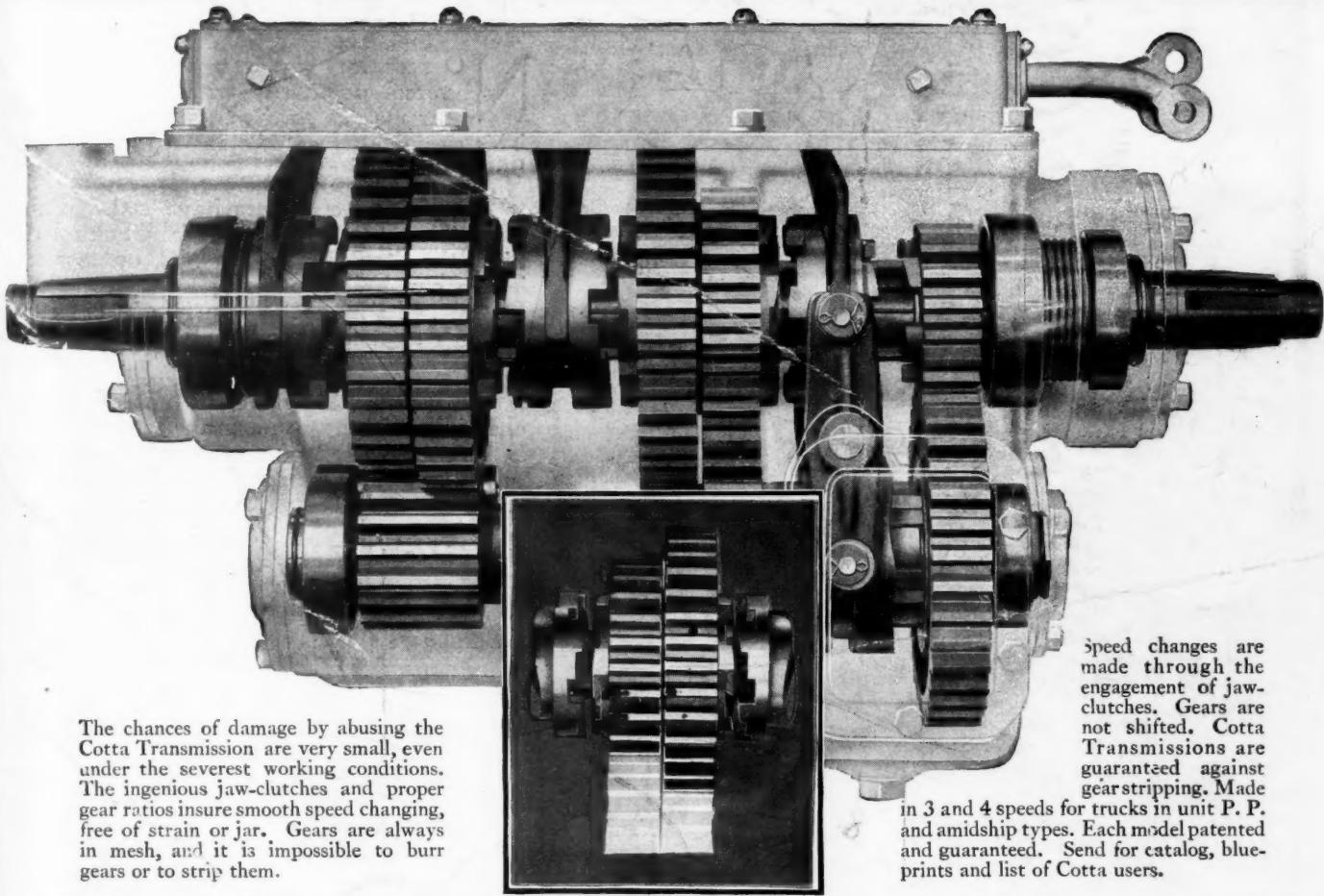
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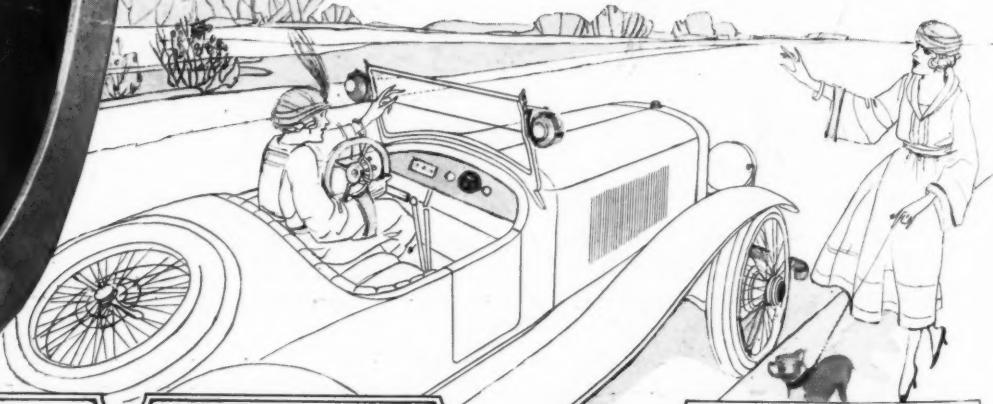


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NEW YORK—THURSDAY, MARCH 25, 1920

No. 13

Air Mail Shows Commercial Possibilities of Planes

This article was written by Mr. Praeger, who heads the aerial division of the Postal Department, after reading the article in last week's issue of this publication entitled, "Shall We Put the Airplane to Work in America?" It is an answer to the critics who doubt the peace-time abilities of heavier-than-air craft.

By Otto Praeger*

THE next years in our history will be years of peace. The question that confronts aviation is, what will be the trend of flying developments in a protracted peace period? Is it conceivable that this development will be purely military in character or even that military flying will predominate? Our highest military authorities have pointed out that it would be financially impracticable for a nation over a long period of peace to keep up a military flying establishment of sufficient magnitude to put the nation on equal footing with the enemy in time of war. These authorities, on the other hand, point out that the hope for air supremacy in the event of war depends upon the peace-time commercial development of the art of flying.

Flying is transportation, and the history of all transportation—notably railway and automobile transportation—has been that it has been developed in times of peace to meet commercial necessities and commercial expansion, and in times of war it was commandeered to meet the necessities of war. I know there is a small group of men who have never been interested in aviation except as an instrument of war and who will not concede any real commercial outlook

for the airplane and, on the other hand, that there is a vast group of men who, while not believing in the commercial possibilities of aviation, still have an open mind because their conclusions are really only surmises reached in the absence of information.

The operations of the air mail for a period of almost two years have demonstrated that the airplane is capable of highest commercial development. It has demonstrated that it is possible to maintain a daily operating schedule with the airplane; that the airplane has that degree of dependability of operation in the air which is essential to commercial utility, and that, for some limited classes of commercial operation, involving great speed, the airplane can operate dollar for dollar as cheaply and at an expedition some one hundred per cent greater than any other medium of transportation.

I am referring now to the cost of carrying certain character of mail by airplane and in railway distributing cars. I will admit it is the only instance which has come to my notice where the airplane operates as cheaply and in some instances much more cheaply than the railway service. Perhaps it is not a fair instance, for there are no railway transportation charges in the world as shamelessly and outrageously high as those which the Interstate Com-

*Mr. Praeger is Second Assistant Postmaster General, in charge of the aerial mail.

merce Commission has decreed that the American taxpayer shall pay for carrying the mails. However, eliminating this single type of competition where the airplane is dollar for dollar cheaper than in certain cases of transportation in railway distributing cars, you still have the element of greater speed which creates for the airplane a legitimate field in our commercial activities.

In this article I shall endeavor to show how the postal operations have established the reliability and dependability of the airplanes in scheduled transportation; how it has rendered a distinct service to commerce through the expedition of substantial quantities of mail, and lastly, how it is possible to perform certain transportation more cheaply than by railroad.

The air mail service has been in continuous operation since May 15, 1918, and its performance record has been a shade better than 90 per cent. The air mail has operated at all seasons of the year and through the worst winter for blizzards and snow that the country has seen in some time. It has operated 200 miles along the Atlantic seacoast with all the fog and weather conditions usually found in that section extending from Long Island Sound to the Potomac River. It has operated across the Allegheny Mountains from New York to Cleveland over a territory heavily wooded with first and second growth timber, and in the snow and irregular wind and storm conditions usually found over mountain terrain.

It has operated over a stretch of more than 320 miles in the wind and snow conditions characteristic of the winters along the edges of the Great Lakes. In this character of territory during the past winter it has made some remarkable records. During February, operating part of the time with snow skids instead of wheels, the air mail planes performed 36 successful trips out of a possible 46 between New York and Washington. The operations in the Great Lakes region were no less gratifying. During the month of January the air mail made 20 out of 26 trips from Cleveland to Chicago, and 21 out of 26 trips from Chicago to Cleveland. During the month of February it made 41 successful trips between Chicago and Cleveland, out of a possible 48.

As an indication not only of the dependability of the airplane to-day but also as a tribute to the Liberty engine and testifying to the efficiency of the Post Office Department aviation personnel in the upkeep of planes and engines and in the intelligent operation of the aerial equipment, I will cite a few individual records of air mail pilots:

Of the five aviators who have been flying the mail for the eight months beginning July 1, 1918, through summer and winter, Pilot Max Miller started 54 trips, of which he completed 51 without forced landings from any cause whatsoever, whether mechanical or weather. His percentage of perfect trips was 95.37.

Of the four pilots who flew seven months, including this winter's flying, Aviator H. T. Lewis started 46 trips, of which he made 45 without a forced landing, for any cause, and completed the entire 46 trips on which he started.

Of four pilots who have been flying for the past six months, Aviator M. K. Reddick flew 53 out of

62 trips without any kind of forced landings and has to his record only three uncompleted trips.

Of the three fliers who have flown only through the five months of the past winter, Aviator Paul W. Smith made 14 out of 17 flights without a forced landing and a record of only two uncompleted trips.

It should be borne in mind that these trips are non-stop flights of 200 miles each on the lines east of Cleveland and 325 miles between Cleveland and Chicago.

Some interesting light has been thrown upon the question of the serviceability of aeronautical motors by the records of the air mail service. Formerly it was considered that a stationary type motor would give about 50 hr. of service before overhauling, and that the total life of a motor was about 250 to 300 hr.

The records of the air mail service show that the Liberty high compression engines have averaged 45 hr. before overhaul and that the low compression type has given an average of 90 hr. Excluding from consideration the engines overhauled because of accidents to the planes in which they were installed, it was found that a Liberty motor, high or low compression, can be depended upon for 90 hr. of service, which in miles is about 9,000 and, then, with the regrinding of valves and inspection of bearings, can continue 50 more hours before a general overhaul is required.

Over half a dozen motors have a running time of over 150 hr. One has a record of 157 hr. 10 min. These motors are awaiting overhaul, at which time the condition of the various parts, as the result of this long run which really sets a new record for running time, can be ascertained. No engines have yet worn out in service. Some Liberties have been overhauled as many as three times. However, a Model A Hispano-Suiza, which was in the first mail ship, has the record to date for longevity. After completing over 250 hr., with a number of overhauls, it was installed again in the original ship and ran 125 hr. straight before being pulled out again on the assumption that something ought to be wrong with it. The bearings were slightly worn.

So much for flying results. Now, let us consider what is the value of this service. First, know that the air mail service is not a special service for a class of letters on which extra postage is paid. Air mail letters go at the same rate of postage as is paid on train letters—2 cents an ounce. The air mail simply supplements the great railway mail transportation system. Its schedules are so woven in with the train schedules as to expedite letter mail by from 12 to 16 hours to the public.

Take the route from New York to Washington. Its purpose is to expedite the New England night mail. This mail is taken from the trains arriving in New York from New England early in the morning and is carried by the plane leaving at 8:40 a. m., the mail arriving in the Washington Post Office before noon. This mail goes out on the 12:20 o'clock carrier delivery. If the plane is delayed by bad headwinds, the mail catches all city carrier deliveries leaving the post office at 1:30 p. m. This mail formerly arrived by train in Washington at 1:45 p. m., if the train was on time, and made a close connection with only a part of the carrier deliveries, but the records showed that even these carrier deliveries were missed last year by the railroad 26 per cent of the time, resulting in delivery of all this mail the following day. The fact that the complaints of the New England business men dropped off by more than 50 per cent immediately upon the establishment of this schedule last July should be convincing evidence as to whether the service is useful.

The air mail from Washington is composed of letters from the Southern States arriving in Washington before 10 a. m. This mail arrives in New York City by airplane in time for the carrier delivery in the afternoon instead of the next morning. In effect, it is an advance of the mail practically one business day.

Between New York and Chicago, we carry westward New York City letters in time for delivery that morning in Cleveland and the rest of the mail, being New York City letters for the Middle West, is put on a train at Cleveland that makes connections at Chicago 12 to 16 hr. earlier than if it had started from New York by train. At Cleveland we take from New York Central train No. 19, which left New York at 5:30 p. m. of the previous day, letter mail for Chicago city. Had the mail remained on the train, instead of being taken by airplane, the letters would have reached Chicago late in the afternoon after carrier deliveries had ceased and could not be delivered until the next morning, whereas the airplane puts these letters in Chicago around 1 p. m. and in ample time to catch city carrier deliveries the same afternoon.

Eastbound, the mail from Chicago and the Middle West and from Cleveland and connections is brought to New York City in time for delivery that day instead of the next morning.

Here is the result:

You can mail your letter in New York City this afternoon in time to catch the New York Central train at 5:30 p. m. The air mail picks up that letter from the train on its arrival at Cleveland to-morrow morning and puts it in Chicago in time for delivery to your correspondent to-morrow afternoon, less than 24 hr. from the time of mailing. Your correspondent can reply at his leisure to-morrow afternoon or to-morrow night and mail it in time to leave Chicago at 11:15 p. m., on train No. 28. The air mail picks up that letter at Cleveland the next morning and delivers it in New York in time for you to read the answer the same afternoon, or in less than 48 hr. after you wrote and mailed your letter.

Is that service worth while? Does the getting of his mail this afternoon instead of to-morrow morning mean anything to a business man?

Now, what is this air mail service costing the public? It is not costing the public one cent, but it is saving the people more than \$100,000 a year. It costs considerably less than \$400,000 a year to operate a 1500-lb. mail capacity airplane one round trip daily between New York and Chicago and, by the establishment of such a schedule, the Post Office Department has been able to discontinue nearly \$500,000 worth of railroad distributing space and clerical hire.

I know it is a mystery to many how it is possible for an airplane to displace such a quantity of transportation space. It will occur to you at once that no airplane ever built can carry the volume of mail that it is possible to load into a 60 ft. car. But these cars are traveling post offices filled with racks and cases over which mail is distributed en route and indeed a small airplane can carry all of the particular mail which had made it necessary to put on such a car, to meet the needs of commerce. A mail plane with but a 400 lb. mail capacity has displaced a 60 ft. car between Cleveland and Chicago and the same size plane has displaced a 60 ft. working car between New York and Washington. If you abolish the air mail tonight, I would have to re-establish to-morrow morning the New York-Washington car and distribution and the New England letter mailed Tuesday night would be delivered by carriers in Washington on Thursday morning

if carried by train instead of Wednesday afternoon if carried by airplane.

This service between New York and Washington by railroad costs at the rate of \$162,000 per year, whereas the faster service by airplane costs only \$120,000 per year. I am sure this situation is not fully understood by Congress. I don't believe that Congress would deliberately not provide the appropriation for the New York-Washington route and thereby force the mail on the slower delivery by train and at an expense of \$42,000 a year more than by airplane. This would be the effect of the appropriation recommended by the Senate Committee on Post Offices and Post Roads, just barely sufficient to operate the route from New York to San Francisco and leave nothing for the service between New York and Washington.

While the Post Office Department is anxious that Congress should appropriate enough money to enable it to continue the service between New York and Washington, it is gratified that the committee has recommended an appropriation of \$1,415,000 for an air mail line from New York to San Francisco. If Congress will authorize an appropriation for such a route, this is how it would affect your mail for the Pacific Coast:

A letter mailed by a New York business man in the regular course of his day's work, late in the afternoon, or any time up to 1 a. m. Monday, will arrive in San Francisco by 9 o'clock Wednesday morning instead of Thursday afternoon by train. But that does not mean that you would receive your train letter Thursday afternoon, because the train is nearly always late in San Francisco and, in a majority of cases, your letter would get to your correspondent Friday morning, two days later than by air mail. But the case is much worse than that. In order to make this 90½ hr. train schedule from New York to San Francisco, the train must make a close connection of 1½ hr. at Chicago—and in that hour and a half the mail must be unloaded at the La Salle depot and transferred across the city to the Union Station where connection is made with the Burlington train. I am assured by our mail transportation superintendents that on an average during the year this connection is missed 40 per cent of the time. Whenever this connection is missed, the mail into San Francisco is delayed a full 24 hr. During the month of January, that connection was missed 31 days out of 31—or 100 per cent of the time. The air mail can reach San Francisco 12 hr. late and still beat the train by 20 hr.—if the train is on time. We can have a smash-up and lose 24 hr. and still beat the train into San Francisco by a half a business day and, if the letter that you mail at the close of your business hours fails to get off on the 8:40 p. m. train out of New York or if the train fails to make the close connection at Chicago, the air mail could be 48 hr. behind its schedule and still beat your letter into San Francisco.

I know that the wonderful performance of the air mail in its 21 months of operation is unknown to many persons. I know that some people are constitutionally opposed to every forward step in human endeavor. I know that some postal clerks are needlessly fearful of the effect of the air mail on their jobs. Where do the business men of the country line up? With the old woman who tried to sweep back the ocean with her broom? With the postal employees' walking delegate who goes about with a bomb under his coat-tail for the air mail? I am confident that when the facts about the air mail become known, the men who make the wheels of American progress go round will vision the possibilities of the airplane and lend a hand to speed the day of this new and inevitable era in transportation.

Puzzling Production Difficulties Confront the Italian Factories

The manufacture of automotive equipment in that country has been severely handicapped, the shipping and delivery problems being the most troublesome. Mr. Bradley reveals herewith the production plans of the larger makers, after having made an extensive trip to the various factories.

By W. F. Bradley*

TURIN, ITALY, March 3.

INDIFFERENT shipping facilities are seriously handicapping the Italian automobile industry. Although fifteen months after the armistice, military freight still has priority on all Italian railroads and, although the value of the lira is low and export business is desirable, manufacturers cannot get needed freight cars to take their products to the ports.

The Fiat company states that their storage space is filled with automobiles that cannot be sent out of the country for lack of freight cars. Each day the accumulation grows more acute, as shippers are refusing to accept any more until their yards have been cleared.

The average time required for shipping an automobile from Turin to London, a distance of not much more than 1000 miles, is 43 days, but it frequently takes three months. In the past, all Italian automobiles for the English market went overland through France to one of the Channel ports. This week, for the first time, English representatives of the Fiat company chartered a steamer to take automobiles direct from Genoa to London. It was nearly five times more costly than by railroad, but under the circumstances there was no choice.

It is expected that during the summer the Fiat company will send their automobiles by road across France, thus delivering them from Turin to London under their own power, with the exception, of course, of the short trip by steamer across the Channel. This plan has had to be considered owing to the shortage of freight cars in Italy and the disorganized condition of the French railroads. During the war most of the Italian automobiles for the French and American armies were sent into France by road, but cost then was of small consideration. The drive-away entails the crossing of the Alps at an altitude of 10,000 ft. above sea level, the pass being generally free from snow seven months in the year.

Fiat is only 60 per cent up to war production. The output is 50 touring cars and trucks and 5 agricultural tractors per day, although during the war, the factory daily produced 100 automobiles of various types. The first of the entirely new post-war types are coming through the factory, but the bulk of the production still is trucks or intermediate types of cars. These intermediate types are rapidly disappearing and within two months it is expected the three new models will be in regular production.

Fiat has been held back by labor troubles, shortage of raw material and coal and the work involved in transform-

ing the shops from war to peace production. The body shops, in which the greatest changes had to be made, are not in such a forward condition as other parts of the factories.

It is Fiat's intention to give great attention to export tractor business. During the past year, Fiat has had wonderful success in all the tractor trials in which their machine took part. In the English trials, the company won one first, two second and one third prizes, these results being better than were obtained by any other machine. In public competitions in France and Belgium, equally good records were made. However, the factory is unable to meet requirements, but plans are being made to devote a large part of the factory exclusively to tractor work.

This company is arranging to overcome the coal problem by using electricity and crude oil. Eventually no coal whatsoever will be burned in the Fiat plants. The machine shops and steel works will be entirely electric. The current is being obtained from water power in the Alps and has to be transmitted less than 40 miles. At present there is a shortage of current, and factories in the Turin center alternately work on Sundays and shut down on the following day.

Lancia is in full production. He is building a four-cylinder, 30-hp. type similar to the pre-war car and expects to get into production on the new 12-cylinder car exhibited at the recent shows by the middle of the summer. This car has finished its tests in a satisfactory manner, but production cannot be started immediately.

Ansaldo, the largest engineering concern in Italy, has entered the automobile field and has just gotten out a light, five-passenger car. It has a four-cylinder engine of 2.7 x 5.1 in., having valves in the head and overhead camshaft. The car has center control, three speeds and reverse, instead of the four invariably employed by other Italian makers, and electric lighting and starting. Hotchkiss drive is used, with two universal joints, this being the only car built in Italy on this system. With this exception, the two axles, the springs, and the steering appear to have been copied from the new Fiats. Weight has been kept low, the complete car with five-passenger body, spare steel wheel and all accessories being said to weigh not more than 1700 lb. Although Ansaldo is a huge engineering concern, being equal to, if not larger than Fiat, it is stated that the car output this year will not exceed 1500.

There is a real automobile famine in Italy, it having been created by the restriction of imports and the slow production. Locally the shortage will become greater if a

*Mr. Bradley is the European correspondent of AUTOMOTIVE INDUSTRIES.

decree, already drawn up, receives the royal signature. It forbids the sale of new cars in Italy, and thus will force the whole of the Italian automobile production into foreign markets.

This drastic proposal, the date of which is not certain, appears to have been proposed with a view to improving the Italian rate of exchange and also to prevent the mad speculation on automobiles now prevalent in Italy. It is believed that 90 per cent of the new automobiles sold by dealers, or manufacturers, in Italy to private owners are immediately bought up by speculators at an increase of 25, 30 or even 60 per cent on the original price. These speculators either put the car in storage against a further rise or send it abroad at a substantial profit.

Most of the manufacturers are doing their best to stop this practice. Lancia, for instance, severs all connection with any of his dealers who sells a car above the list price. Manufacturers, however, are helpless against the private owner who agrees to sell his new car a few hours after it has been delivered at, say \$2,000 more than he paid for it. Among the persons agreeing to these resales are the elite of Italian society, who, although in need of a car, cannot resist the temptation to make money so easily. The speculators have such a profitable field that they buy up new and used Fiats and Lancias and send them to England, where they can dispose of them at good prices over the heads of the accredited distributors in that country. As an instance of the high prices prevailing, Fiat touring cars which were sold to the American Army during the war for \$2,400 are returned to Italy and can find buyers at \$4,000 (these are nominal rates of exchange). The

cars have seen war service and are only patched up to look new.

If the proposed decree goes into effect it will force speculators to throw their cars on the market, and it will prevent them shipping abroad at extortionate prices. The measure is so unusual that there is a fear it would provoke retaliation by foreign makers.

A recent incident at the Ansaldo factory tends to give the impression that Italian labor conditions are very unsettled. At these works a number of men established a soviet, declared the management incompetent and voted themselves in charge of the works. A few hours later they were turned out by troops and the management resumed control. This is only a local outbreak by a few hotheads, and need not be accorded much importance.

In the Turin center, which comprises the whole of the automobile industry, labor is much more organized and the movement is of a more political nature. The workers are claiming a voice in the directorate of the big companies. Because the management asked for a meeting between themselves and the workers to be postponed for two hours, all the men in the Fiat shops downed tools for half a day last week.

Generally the Italian workers are not dissatisfied with their material conditions, for since the war they have secured the eight-hour day and important increases in wages. Lancia says that the best remedy for discontent is production. "With the works organized to give regular employment and with a system of premiums for production, there is no talk among the Italian workers about strikes and grievances," he has said.

Revived Cult of Air-Cooled Engines in Britain

IT would be interesting to learn the basis of the revived cult of the unjacketed air-cooled cylinder. Probably it is the outcome of three factors—war-time experience with radial cylinder engines, both of the static and revolving types, the quest for higher thermal efficiency and the search for reduced weight.

This revived cult of the air-cooled cylinder points to a return to the earliest experience with light combustion engines, for it is a fact that the first specimens beyond the experimental stage were unjacketed, and it is also noteworthy that, when indirect cooling was first applied, it was limited to the regions of the cylinder head and valve chambers. De Dion and Aster, in France, and Lanchester and Holden, in England, went through a full range of experiments with air-cooling, followed by water-cooling, and early users of the products of some of these pioneers recall that they failed rather because of lack of the materials now available than for lack of the specific knowledge based on experience which is now found in so many text books and papers.

The problem of materials which combine higher conductivity with freedom from distortion and which are capable of withstanding prolonged spells of a high working temperature, is still formidable, but it may be that its solution will be found rather in improved foundry methods than in some new grade of material. On this score it may be well to note that the "whirling" method—American by the way—of casting, now being used with some success for casting piston rings almost ready for use, may prove to be applicable for fin-jacketed cylinders of plain concentric form, with removable head.

The desirability of reducing the gross weight of the

chassis is beyond dispute, but it is a mistake to suppose that any notable saving of weight results from substituting fins for the water jacket. The saving often amounting to 100 lb. and more is due to the elimination of the radiator and water.

These comments are prompted by the threatened failure—as seems likely by the latest reports to hand—of the *Times* (London) special aircraft pioneer flight from Cairo to the Cape. The lurking cause is the leaking cylinder jackets of the twelve-cylinder Rolls-Royce engines and it will be recalled that, on another long distance flight, a British machine had a breakdown from the same cause. These engines, like the American Liberty, have oxy-acetylene welded sheet-metal jackets and the writer has seen them in course of making and testing. In war time, much of this fine work was done by women, who seemed to be apt at the job and to have the dexterity and lightness of touch peculiar to such work. Possibly this work is being done now by men who on the whole are not as expert with the blow-pipe as the women. Whatever the explanation, the fact is clear that these fine engines are more liable to failure from what may be considered trivial causes than from direct mechanical breakdowns. A sister machine to the Rolls-Royce mentioned before—the "Silver Queen"—is reported also to have crashed from the same defect.

ANNOUNCEMENT is made from Ottawa that Canada is expecting a material increase in immigration this year. Plans are now being laid in the department in charge of such work to take care of an anticipated influx of not less than 60,000 Americans.

Saxon Offers Changed Design and Construction in New Model

Incorporated into this 1920 product, the work of A. P. Brush, are numerous features of interest. It has overhead valves, deep frame construction and double transverse cantilever springs. In addition, the oiling and intake manifold systems and propulsion members are worthy of study.

By J. Edward Schipper

SHIPMENTS on the new Saxon—models of which were exhibited at the recent shows—commenced in the early part of March. It is a new model throughout and present plans call for a minimum production of 7500 cars for 1920.

This Saxon is an entirely different product from any of its predecessors and is a Brush design, incorporating the overhead valve system, deep frame construction and double transverse, cantilever rear springs for which A. P. Brush has stood sponsor. It includes, besides, a number of new features, relating particularly to the oiling system, the intake manifolding system, and the propulsion members.

The engine is a four-cylinder block cast, two-bearing type, with $3\frac{3}{8}$ x 5 in. cylinders, giving a piston displacement of 178.8 cu. in. The overhead valves are assembled with the detachable head unit and are actuated through push rods and rocker arms. The engine is mounted at three points, one point at the front and two points on the center cross-member of the frame. The transmission gearset is of the unit powerplant type, being bolted to extension members on the rear end of the crankcase. This is a skeleton construction, lighter in weight than a bell housing, and, although it gives a unit power plant, is not of the completely inclosed construction necessary with clutches requiring an oil-tight housing.

The upper part of the crankcase is cast integral with the cylinder block. The oil pan is a steel stamping. The pistons are cast iron, 4 in. in length, equipped with three $\frac{3}{16}$ in. piston rings, step cut and concentric, all above the piston pin. The pin is clamped in the upper end of the connecting rod and takes its bearing in the piston boss. It is 1 in. in diameter and operates within bronze bushings in the piston. The connecting rods are drop-forged and machined all over. They are strongly webbed at the bearing end to insure a rigid bearing surface. The connecting rod bearings are bronze-backed, babbitt-lined, $2\frac{1}{4}$ in. in diameter and $1\frac{1}{2}$ in. in length.

The crankshaft is particularly interesting, being a two-bearing type and of such diameter that it should be immune from whipping or distortion at any speed within the engine's range. It is fully counterweighted for rotative balance, the two bearings being bronze-backed, babbitt-lined. The front bearing has a diameter of $2\frac{1}{2}$ in. and is $2\frac{5}{8}$ in. long, the rear having a diameter of $2\frac{3}{8}$ in. and is $3\frac{1}{8}$ in. long. These are shimless bearings, carefully aligned, so that there is no break in the bearing metal between the bearing and the cap. The reason for the shimless construction will be brought out in the description of the oiling system, as this is one of the factors in the oiling scheme.

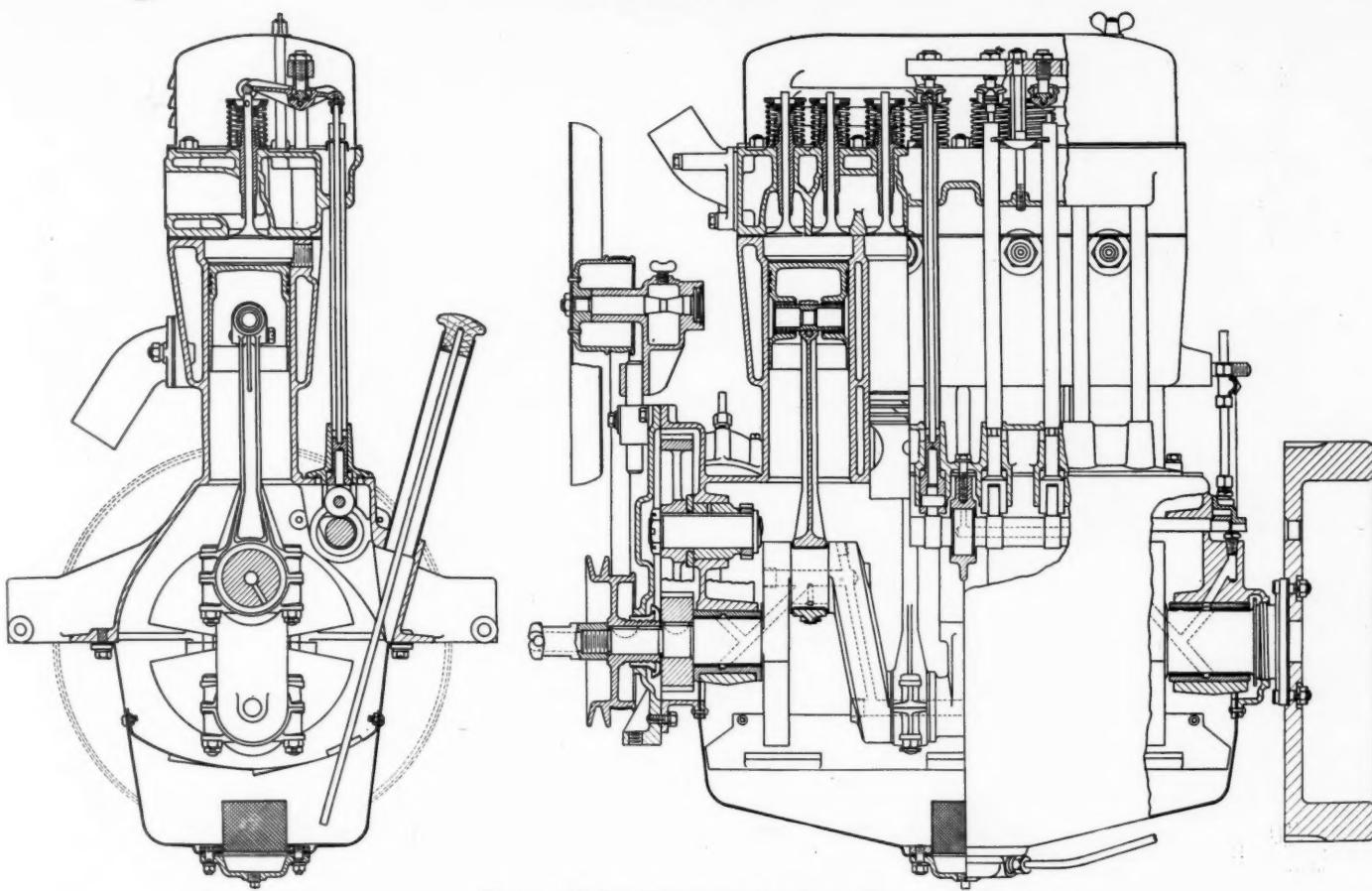
The camshaft is driven by helical gears of $1\frac{1}{4}$ in. face. It is mounted on three bearings and is a drop-forged, integral type, the cams and timing gear being integral with the shaft. The front bearing is $2\frac{1}{8}$ in. in diameter and $1\frac{1}{2}$ in. long, the center $1\frac{3}{4}$ in. by $\frac{7}{8}$ in., and the rear 1 in. by 2 in. The valve



The new 1920 Saxon with touring body

rods are actuated through roller followers and pass through removable guides. The rocker arms, which have contact with the lifter rods and the valve stems, have a rocking contact with each and the adjustment is on the pivot, permitting the valves to be adjusted while the engine is running. The valves are of the tulip type with a $1\frac{1}{2}$ in. clear opening, a $\frac{3}{8}$ in. lift and $5/16$ in. stems. They are of tungsten steel and are equipped with double springs of chrome vanadium steel. The use of the double springs is to guard against periodic vibration, which may occur in case synchronism is set up between the engine and valves at the critical speeds of the valve springs. The entire overhead valve system is covered by a nickel plated, removable cover.

The carburetion system is patented and is designed to obtain a high degree of thermal efficiency. The fuel is introduced through a Stromberg $1\frac{1}{4}$ in. carburetor of the vertical plain tube type. At low engine speeds,



Four cylinder Saxon engine in section

fuel is taken from the carburetor into an expansion chamber located in the manifold just above the throttle valve in the carburetor. On the conical sides of this expansion chamber, the apex of which forms a venturi tube for the manifold, unvaporized particles of fuel are gathered out of the main stream of the fuel and permitted to trickle back to an eddy space, the outer walls of which are formed by serrated rings of metal integral with the exhaust manifold and heated by the exhaust gases. At this point, the globules of fuel are vaporized and passed back into the main stream. This system is designed to prevent unvaporized fuel passing into the combustion chamber, and, furthermore, to assure uniform distribution that is not possible with liquid fuel. It is claimed that the dilution of lubricating oil and the formation of carbon deposit from liquid fuel is solely due to the faulty distribution caused by liquid fuel in the intake passages.

In order to secure equality of distribution of fuel to the cylinders, a distribution chamber is used which compels an eddying of the passing fuel in a uniform manner at the openings of the respective horns of the intake manifold. Each of these horns is divided into two passages, by a vertical wall through the center. The vaporized fuel passes from the distribution chamber to each of the passages of each horn and to common outlets for the front and rear pairs of cylinders. As the flow to each cylinder leaves the common stream at the intake port, it is claimed that the distribution of fuel is uniform. This method of distribution from a point just above the carburetion expansion chamber is claimed to eliminate the surging of gases in the intake manifold. The fuel feed to the carburetor is by the vacuum system.

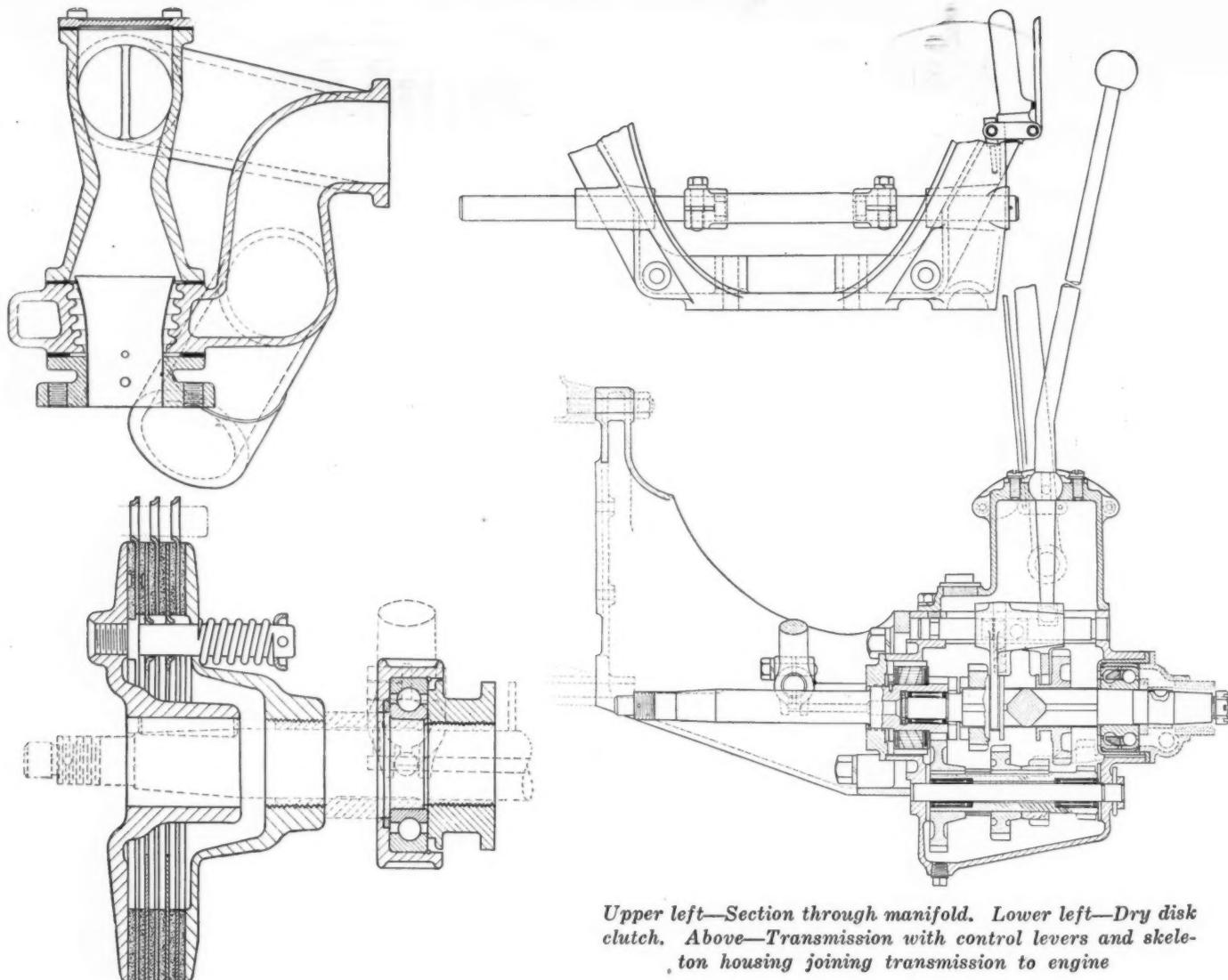
The fuel tank is mounted at the rear and is of 18 gage metal, having a capacity of 15 gal. It is guarded by a frame extension which, with a tire carrier, affords pro-

tection from the rear. The tank is fitted with a gage and filler cap of composition material.

As regards the lubrication system, it should be pointed out that the oil is intended to cool as well as to lubricate the bearings, hence it is circulated at a rate far exceeding that necessary for lubrication only. A gear driven pump at the rear of the camshaft takes oil through a strainer and delivers it through an annular passage in the rear crankshaft bearing at a pressure which varies up to 50 lb. This pressure is controlled by the vacuum in the intake manifold and consequently varies in proportion to the load on the engine. Cylinder wall lubrication is by spray from the connecting rod bearings.

By means of the vacuum control, the flow of oil is at all times governed by the engine speed and the amount used for lubrication is controlled by the pressure. The vacuum system which controls the oil pressure relief at the front end of the crankshaft is in direct communication with the inlet manifold. The crankshaft bearings are not grooved in the customary manner, but there is simply an opening to allow a passageway for the stream of oil to enter the bearings. Here the oil pressure is sufficient to maintain the film between the shaft and the bearings, preventing metallic contact. With this type of bearing it is possible to use a greater clearance at the bearings than with the usual low pressure lubrication and it is claimed that there is no necessity for running-in a new car. That is, owing to the larger clearances and the pressure lubricating and oil cooling arrangements, a car may be driven up to maximum speed immediately without damaging the bearings.

The camshaft front bearing lubrication is by pressure direct to this bearing. The center bearing is lubricated by pressure through the camshaft from the rear bearing, the oil reaching the camshaft rear bearing by pressure from the crankshaft rear bearing. The timing



Upper left—Section through manifold. Lower left—Dry disk clutch. Above—Transmission with control levers and skeleton housing joining transmission to engine

gears are lubricated by overflow from the oil relief and the valve mechanism by oil vapor through the tubes which surround the valve lifters. The connecting rods do not splash. The oil is carried in a pressed steel pan with a capacity of 5 quarts. An oil pressure gage is located on the instrument board in the driving compartment of the car. The oil level gage is mounted on the forward left end of the engine.

Cooling is by the thermo-syphon system in connection with a cellular radiator, having a water capacity of 17½ quarts. The core is hung in the shell, which is removable, and is supported on cross-members of the frame by a steel bar. A motometer is furnished as standard equipment. The fan is a plain bearing, 14 in. type.

The Wagner electrical system is used for starting, lighting and ignition, in connection with a Prest-o-Lite battery. The generator is mounted at the front of the engine, on a swinging cradle, on the right, and is driven by a rubber cord belt from the engine crankshaft. It is driven at 1½ times crankshaft speed. The Wagner relay is mounted on the dash and the starting motor at the right rear of the engine, engaging the flywheel through a Bendix gear. There are 12 teeth on the gear and 122 on the flywheel. The Prest-o-Lite battery has 13 plates and is of 80 amp. hr. capacity. It is mounted on the bracket in a steel box in the frame.

The clutch is a dry plate type with three driving plates lined with molded asbestos composition. The plates

are stud-driven and are pressed together by three springs, all adjustable. The clutch housing is of cast iron and is bolted to the crankcase. The clutch spring has a pressure of 300 lb.

The gearset is a sliding, selective type, providing three speeds forward and one reverse. The speed ratios in the gearbox are as follows: High, 1 to 1; intermediate, 1.82 to 1; low, 3.61 to 1; reverse, 4.5 to 1. The transmission gears are of nickel steel and have $\frac{5}{8}$ in. and $11/16$ in. faces. The sliding gear is a square fit on the shaft and the countershaft gear is keyed to the sleeve shaft. The bearing mountings are Hyatt high duty, outside of the sleeve gear. At the rear end of the main shaft is a double row ball bearing. The countershaft sleeve shaft and the reverse idler are mounted on rollers.

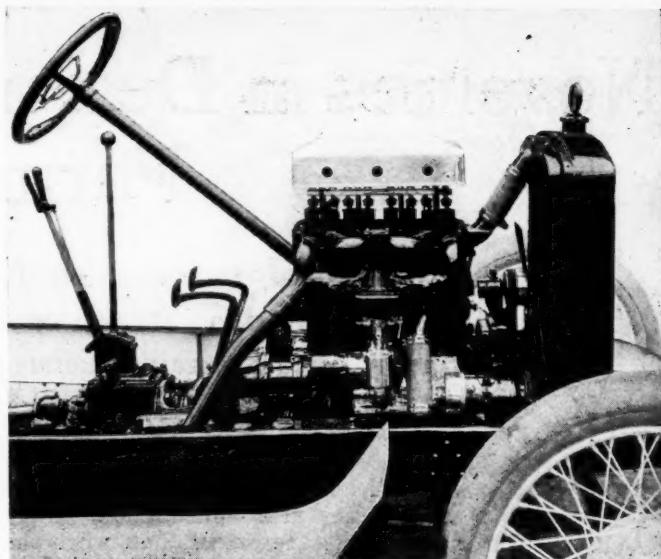
The rear axle is a three-quarter floating, providing a ratio of 57 to 12, or $4\frac{3}{4}$ to 1. The differential is a four-pinion type and the bearings are Timken at the differential, radial at the drive pinion, double row ball at the front end of the pinion shaft, and radial at the wheels. The housing is pressed steel, reinforced with tubing, while the differential carrier is malleable iron. The pinion adjustment is accessible at the front end, with the gear adjustment accessible by removing the gear cover. The shafts are chrome nickel steel of the six-spline type.

Rear axle torque is taken by a pressed steel torque arm bolted to the rear axle. The connection at the

front end is a ball and socket spring joint. The torque arm ball socket and the front brake eye on the service brake and on the hand brake all act in one plane, so that road action of the rear axle does not set up any brake action.

Steering is by a worm and gear mechanism of the irreversible type. The gear is mounted in a trunnion in the frame bracket. The front axle is an I-beam type. The wheels are 32 in. and of the twelve-spoke type, carrying 32 x 4 in. tires. The car has a chassis wheel-base of 112 in. The brakes are 14 in. in diameter, 2 in. wide, mounted on the rear wheels. The front springs are semi-elliptic, 2 in. wide and 30 in. long, shackled at the rear. The rear springs are 2 in. wide and 40 in. long, of the double cross type; they are seated on a projection of the rear axle brake housing, being shackled at one side to the frame and axle to prevent side sway.

The bodies are built on wood framing with metal panels. The doors are provided with outside bar handles and inside levers. The car has a shipping weight of 2400 lb. and a road weight of 2700 lb. It is priced at \$1785, f. o. b. factory.



Forward end of Saxon chassis

A Gasoline Industrial Tractor

FOR inter-departmental, yard and other short-run work there has been found a growing need for industrial tractors for the purpose of hauling trailers or skids about plants. Vehicles for this purpose must be rugged and built to stand all-day usage. The Towmotor is a gasoline driven industrial tractor brought out for this purpose by the Towmotor Co. It is an all-steel machine built of standard units for the specific requirements of industrial haulage. It is sufficiently large to move freight cars and at the same time is built to accommodate light loads also.

The Towmotor is a 3200-lb. vehicle, with a 60-in. wheel-base and 90-in. length overall. It has a tread of 44 in. and an overall width of 52 in. The turning radius overall is 10 ft. It can operate practically through 7-ft. aisle intersections and has a speed of 1 to 15 m.p.h., controlled by governor. The torque and drive ratios furnish drawbar pull sufficient for handling a trailing load of from 10 to 15 tons under average conditions.

The engine is the four-cylinder Weidely, 3 3/4 by 5 1/2 in., rated at 22.5 hp. The engine is capable of delivering 40 hp. at 2000 r.p.m. The governor is of the centrifugal type, integral with the engine, and fully inclosed. It is adjustable to govern at suitable speeds from 1000 to 2000 r.p.m.,

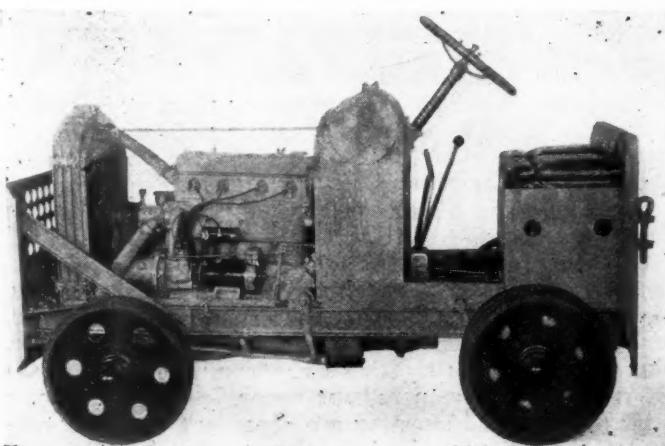
according to plant and load conditions. Ignition and starting is by the Delco system, with Bendix drive.

The clutch is a 10-in. single-plate Borg & Beck type, driving through a standard selective unit transmission gearset providing three speeds forward and one reverse. An alignment joint of the Thermoid-Hardy type is located between the gearset and the rear axle, the latter being a special adaptation of the Torbensen internal gear type of drive. The axle is so arranged that the drive is higher and more nearly on a straight line. The reduction ratio is 8 to 1.

The Elliott truck type of front axle is used, and steering is also on truck lines, with steering connections to the front wheels only. Springs are fitted at the front end only and these are semi-elliptic. The wheels are cast steel disk and the tires solid rubber, pressed-on type, interchangeable front and rear. The front tires are 22 by 3 1/2 in., single, and the rear tires are of the same dimensions, but dual.

The frame is a pressed steel 4-in. channel section, provided with heavy steel plate bumpers, front and rear. Front and rear couplings are of adjustable height to accommodate the load.

Deliveries on the Towmotor have commenced and production is now under way. The price is \$2,150 f.o.b. Cleveland. Optional equipment, costing \$100 extra, is 27 in. wheels.



The Towmotor

Airplane Interiors

A WRITER in *The Aeroplane* states that the most impressive features at the recent Paris aircraft show were in the line of interior decoration. He is not discouraged, however, and says that technical progress will come in time. "Those pink boudoirs are signs that the airplane has really become commercial," he said. "A machine to meet the conditions of the good Monsieur Michelin's price competition, having a speed range of 125 to 6 m.p.h., will be produced sooner or later. Had it actually been produced and exhibited at Paris it would not have impressed the general public one-half as much as the machines with the pink insides."

Novelties in Design of the Sunnyhome Farm Plant

There are several features about this light and power outfit that probably will become popular. Its degree of automatic control, the voltage control, the precautions against damage from freezing and the house that is a part of the original purchase are interestingly described in this article.

Some novel mechanical ideas are embodied in the design of the Sunnyhome farm lighting and power plant. It is automatic to the extent that, when the charge in the battery runs low, the engine is started to replenish it and when the battery is fully charged the engine is shut down. In addition, when there is anything wrong with the plant, as, for instance, when there is no gasoline in the tank, a red signal light, which can be installed in the kitchen or some other place where it is sure to be observed, will light up. In case of a freeze-up of the piston the main switch opens in three seconds. Voltage control is undoubtedly simple and less expensive than control by an ampere-hour meter.

The Sunnyhome plant is made for 110 volts only, the advantage claimed being that current-consuming devices adapted for 110-volt circuits are to be had at every electric supply store, whereas low voltage-consuming devices are more difficult to get. Besides, with the 110-volt system, it is possible to carry current to a distance up to one mile if desired. For the same drop in voltage and equally close regulation it is necessary to use 12 times the amount of copper in the circuits with the 32-volt system as with the 110-volt system.

Another point in which the Sunnyhome generating set differs from most others on the market is that the engine crankshaft and the generator shaft are separate and are connected by means of a flexible coupling. The crankshaft is mounted on two roller bearings and the generator armature shaft on two ball bearings.

The engine is a single cylinder type of $2\frac{1}{2}$ in. bore and 3 in. stroke. It is rated at $2\frac{1}{2}$ hp., at 2000 r.p.m., while the generator rating is $1\frac{1}{4}$ kw. The cylinder is of the valve-in-head type, the valves being operated through pushrods extending up the side of the engine. A cast iron piston is used and the crankshaft is provided with counterweights for balancing. As already intimated, by the reference to the fuel tank, gasoline is the fuel used. Engine speed is controlled mainly by the load, but in case the flexible coupling between engine and generator should

break, and thus the load be removed, a simple form of suction governor provided in the inlet passage will prevent the engine from racing. Ignition is by the battery and coil system.

To prevent difficulty from freezing of the cooling fluid in cold weather, oil is used for cooling. There is a supply of 5 gal. carried in the base, this serving for both lubrication and circulation through the cooling system. One supply of oil is said to be sufficient for a whole year's running. The oil is circulated by means of a gear pump

and is fed to the engine bearings under pressure. A fan draws air through the generator and radiator, and, after leaving the radiator, the air flows through a passage-way in the top of the house and through shutters in one side thereof. In cold weather these shutters are closed by means of a siphon type thermostat located within the house. The exhaust air from the cooling system is then discharged inside the house and tends to keep the house at a moderate temperature. As soon as the temperature within the house rises again the siphon will automatically open the shutters. In extremely cold weather, if the plant happens to be working, it will be automatically started by the thermostat and charge the battery for a

few minutes, when it will shut down.

The house in which the generating plant is located is made of side walls and roof consisting of two sheets of metal with a packing of heat-insulating material in between. A muffler connects to the exhaust outlet through a short pipe and discharges through an opening in the wall of the house.

Reference has been made to the automatic starting and stopping of the set. As with all other small lighting sets, the engine is started by using the generator as a motor, running it on current from the storage battery. However, where generally the starting and stopping of the set are determined by an ampere-hour meter, in the Sunnyhome outfit starting and stopping are dependent upon the voltage of the battery. It is a characteristic of the lead storage battery that as the charge nears completion the



A view of the Sunnyhome Electric Plant

terminal voltage increases and vice versa. Therefore, when the voltage attains a certain value a switch is opened and the plant stops. From this moment on, any load on the circuit will be carried on the battery alone and as the charge of the battery becomes depleted its voltage drops, a switch is automatically closed and the plant is started up again.

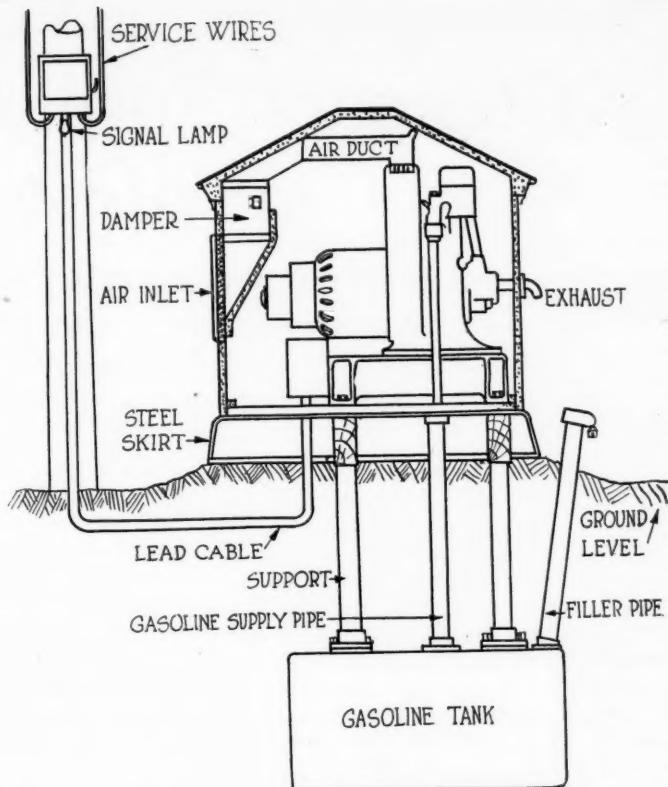
The voltage at the terminals of the storage battery is always somewhat higher when the battery is being charged than when it is discharging and, to render the line voltage as uniform as possible, a booster is cut into the line whenever the battery is discharging and cut out when the battery is charging. A voltage regulation within 3 volts is claimed, except at the moment when the engine is broken loose in starting.

In order to insure the greatest possible reliability as regards starting in cold weather an electric coil is provided inside the carburetor. The coil is located in the mixing chamber beyond the spray nozzle imparting heat to the incoming mixture. Gasoline is forced from the underground tank to the carburetor by means of air pressure, generated by a pump on the engine, and the excess gasoline overflows back into the tank.

The battery furnished with this set consists of 52 cells arranged in two trays, one on either side of the generating set. It is of U. S. L. make and has a capacity of 35 ampere-hours. The cells have hard rubber jars, and these jars are placed in two wooden boxes alongside the generator set base.

The Sunnyhome electric plant will be manufactured by the Sunnyhome Electric Co., of which J. Parker B. Fiske is general manager, D. E. Anderson, designing engineer, and R. D. Puckett, experimental engineer.

This plant is sold with a little house, so that it can be installed outside existing buildings. The installation is made in a way to minimize the work involved. The 75-gal. gasoline tank, made of boiler steel, serves as the foundation of the plant. The tank is sunk in the ground in a 4½-foot hole, which is later filled up with dirt. From the

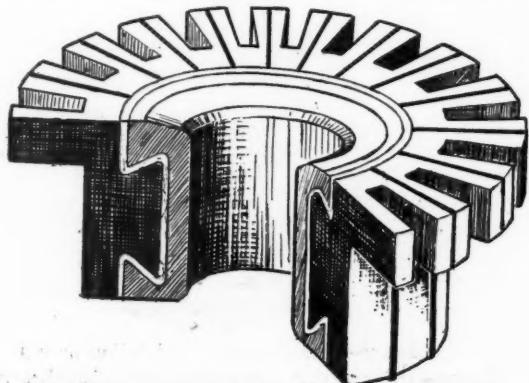


Diagrammatic view showing installation

gasoline tank rise four tubular pillars and two wooden beams are secured to the tops of these pillars. A sheet-metal skirt, giving the effect of a regulation cast iron base, is fastened to the beams, and extends down level with the ground. The house enclosing the plant sets directly on this base.

Improved Commutator Construction

A COMMUTATOR having a one-piece steel core and especially adapted to quantity production has been developed by the Toledo Standard Commutator Co. In an ordinary commutator the segments are held together by a sleeve of steel or cast iron, made with a tapered flange at one end, and a washer and nut, which latter screws over the sleeve at the other end. The place of these various parts is taken in the Standard commutator by a single piece core or holder of soft steel. This core is turned of such shape that the edges of the two conical



Commutator segments secured by steel core

retaining flanges are sufficiently far apart to permit of the commutator bars being inserted. A mica insulation is placed over the core before the segments are inserted, and the core is then compressed endwise so that its conical flanges grip the holding portion of the segments. Compression of the core in a press is effected in three stages. The inward wedging of the flanges of the core into the notches of the segments is accomplished by means of presses and dies. Before the final operation the commutator is baked for 3½ hours at a temperature of 350 deg. Fahr. By this baking all the volatile substances are eliminated, so that after the final closing of the core the commutator is free of all elements that are likely to be changed by the heat of operation. In the final closing process pressure is exerted simultaneously upon the axis of the commutator and radially inward upon the segment.

A special process is also employed for producing the bars from which this commutator is assembled. Sections of the proper length are cut from round copper wire, and these are then rolled into the proper form for the segments, both a longitudinal and a transverse rolling process being employed. The pressure exerted upon the wire in the rolling process has a hardening effect, and is claimed to give a harder and denser bar than is obtained by any other process.

Compact Form of Ignition Set on 1920 Car Models

Some of the features which the Westinghouse company has attempted to combine in its new ignition set are a self-lubricating cam, compactness, efficiency of coil, breaker contacts requiring little adjustment, and a condenser that is said to be indestructible.

A NEW Westinghouse ignition system, designated Type SC, will be fitted to several 1920 car models. Its features are enumerated by the manufacturers as follows: An indestructible condenser, a self-lubricating cam, a highly efficient coil, and breaker contacts that rarely require adjustment and should never need renewal.

This ignition set, which is of the non-automatic, closed-circuit, two-unit type, is suitable for use with 6- and 12-volt batteries and for 4-, 6-, and 8-cylinder engines for all automotive and stationary services. It can be supplied for either generator or engine drive, and a magneto replacement can also be furnished.

The distributor head consists of a base, or cup, which holds the condenser and breaker-mechanism, and a cap, which carries the high-tension contacts. The base is made of cast iron and is covered inside and out with baked-on enamel. It is provided with ventilating openings, which permit the escape of the nitrous oxide, formed by the spark at the breaker contacts, and thus prevents corrosion of the metal parts.

The breaker mechanism consists of two arms; one of which is moved by the cam and the other is stationary. Each arm carries a contact. The movable arm is of special shape, and when operated by the cam, causes the contacts to open and close with a wiping action, which

keeps the surfaces clean and free from pitting. The stationary contact is held in place by a screw, which, when loosened, permits adjustment in three directions and makes alignment with the movable contact a simple matter. The contact points are of pure tungsten and are securely riveted to the arms.

The cam is of special interest. This part is generally made of fiber, steel, or some other metal, and as there is little opportunity for lubrication, unsatisfactory operation is apt to result from wear. The Westinghouse company, therefore, resolved to prepare a material suitable for cams that would not require lubrication, and after a long series of experiments, has produced a compound of graphite mixed with bakelite, which is moulded under heat and high pressure. This material, we understand, has proved to be very satisfactory, and cams made of it have operated thousands of miles on car tests and many hours at high speed on bench tests without showing appreciable wear.

The condenser is encased in a tinned steel box with a close-fitting cover wiped-soldered to the box. The lead wire is heavily insulated at the point where it leaves the box.

The distributor arm is mounted on a bakelite block, which is carried on top of the distributor shaft.

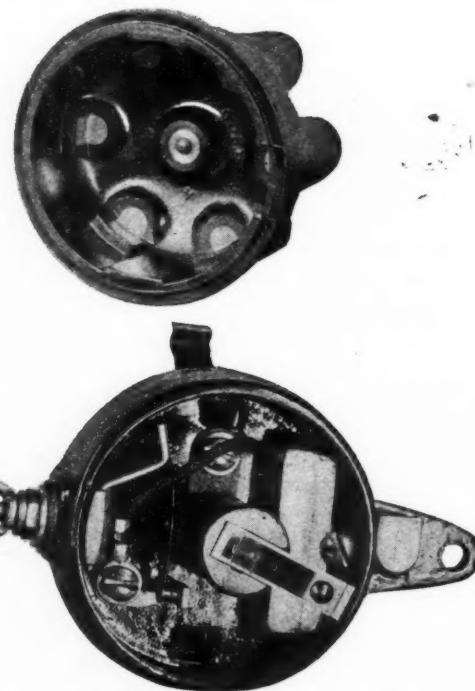
As shown by the illustrations, removal of the distribu-



Westinghouse coil with compensating resistance



Westinghouse ignition unit



Above—Inside view of distributor cap
Below—Interrupter, condenser and distributor block

tor cap exposes all parts for inspection. Each part, including the shaft, can be removed on taking out a single screw. The screws are standard stock and can be obtained at any hardware store. All parts except the cam and the distributor cap are the same for 4-, 6-, and 8-cylinder outfits.

The distributor cap has embedded in it as many brass, thimble-shaped inserts as there are engine cylinders to be supplied with sparks, plus one center one, which is connected with the coil. The bakelite compound is forced around these inserts into the shape of high necks above the top of the cap, so that the cap is one solid piece and has no joints at the bottom of the necks to admit moisture and cause grounds, which may happen when the necks are screwed on. The top of the cap is crowned to shed moisture and a drip mould is provided around the base for the same purpose.

The center contact is a graphite ball spun into a recess in its metal insert. A steel brush on the distributor arm presses continuously against this contact, the spark jump-

ing from the end of the distributor arm to the engine-cylinder inserts in the proper order.

The clips, by means of which the high-tension cables are connected to the distributor terminals, are of ingenious design and can be applied quickly without solder. They make an excellent mechanical and electrical connection, and can be removed and used again without difficulty.

The coil has its windings encased in a micarta tube, with an insulating compound of high melting point poured in to exclude moisture. The mounting base is of steel and the cap is of vitreous porcelain baked in insulating enamel. Both cap and base are put on and set up tight by means of a through bolt when the compound is still hot. Ballast coil is mounted in a groove around the cap.

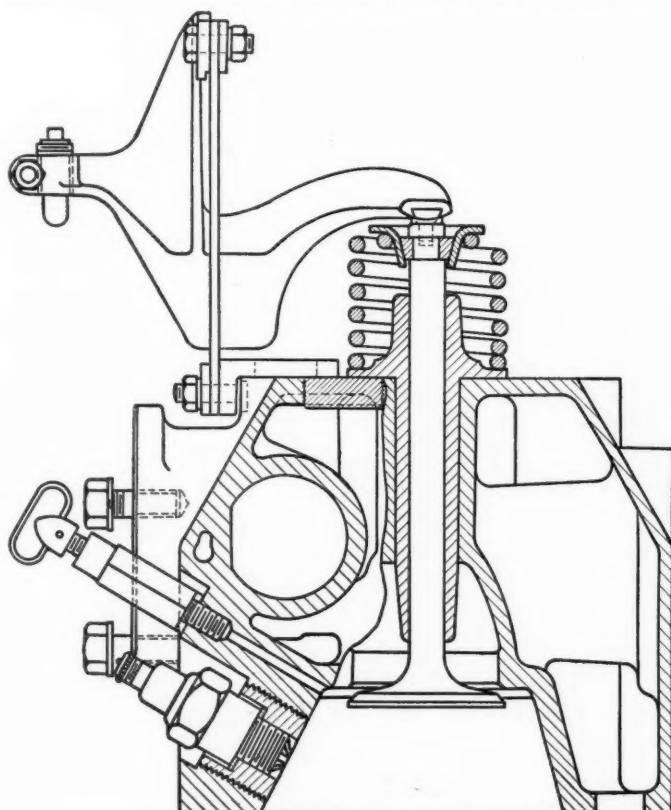
For high-grade cars, where appearance is of importance, this ignition is furnished in a de luxe type. The distributor base casting is made of magnalium and the various parts are copper and nickel-plated and hand-buffed. Two-spark (dual-spark) equipments are furnished in this type.

Straker-Squire Valve Rocker Arm Construction

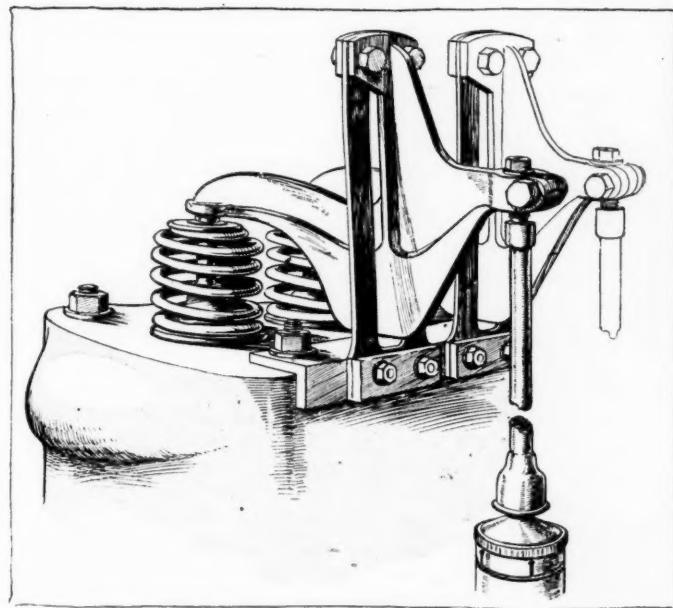
THE new model of the Straker-Squire 3-5-ton truck chassis embodies an entirely new system of overhead valve gear, in addition to a number of other distinctive features that cannot be dealt with at this time.

As the accompanying illustrations show, the rockers, operated by push rods, have no pivotal bearings of the usual kind, but each is anchored at its upper end to a U-shaped spring which, by its flexibility, allows the necessary angular movement.

The peculiar shape of the rocker will be remarked upon. The downward extension is provided "to give dynamic balance to the upper portion of the rocker, so that there is no lateral acceleration of the rocker as a



Sectional view of Straker-Squire overhead valve gear



Straker-Squire overhead valve gear

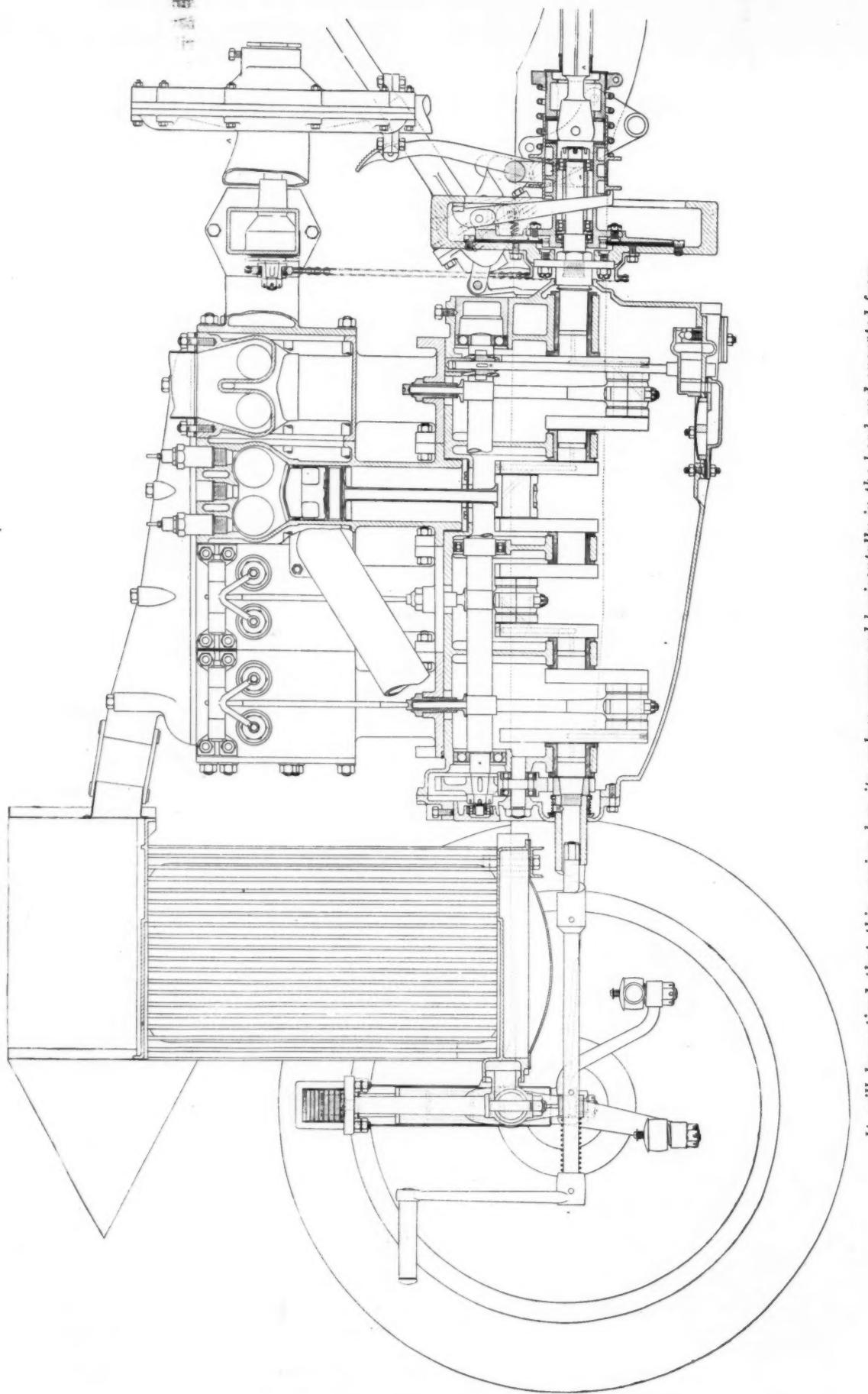
whole." The rocker is wholly supported by the leaf spring; there is no rubbing contact at any point, thus removing the need for lubrication of the overhead details.

The arrangement has, it is claimed, an additional advantage over the usual systems in that the lateral flexibility of the spring allows the end of the rocker in contact with the valve stem to move in a vertical line instead of through an arc. Side pressure upon the stem is thus eliminated and, with it, wear of the stem and guide arising therefrom.

The whole series of springs is bolted to an angle plate that in turn is secured to the detachable head of the cylinder by the holding-down nuts of the latter. All the rockers, therefore, can be removed simultaneously.

The outer end of the rocker is slotted and provided with a pinch bolt to secure the screw with which clearance is adjusted. Normally, the inner arm bears lightly upon the valve stem, the two being kept in contact by the spring blades.

Sizaire-Naudin 183 cu. in. Racing Engine Built in 1912



It will be noticed that this engine has its valves arranged horizontally in the head and operated from a camshaft in the crankcase. There are five bearings on the crank, which is rather light judged by present standards. Ball bearings are fitted on the camshaft

The Design and Construction of the 183 cu. in. Engine

Part 1.

European makers have built many machines of 3-liter piston displacement such as has been made the basis for the racing cars at the Indianapolis speedway this year. This article, which will be continued, analyzes the European practice and points the way for the American builder.

By S. Gerster and W. F. Bradley*

UNTIL 1911, European automobile races had been either for large or for small cars limited only as to bore. This latter rule had been adopted in order to encourage the use of long strokes. With the bore of a single-cylinder engine limited to 3.9 in., the stroke had been gradually increased until Sizaire and Peugeot had each attained 10 in. It was not until everyone was converted to the value of the long stroke and high piston speeds had become common, that the 3-liter or 183 cu. in. rule was adopted.

The first race under this rule was held at Boulogne, France, in 1911, and resulted in victory for Delage, who was pressed hard by Peugeot. The Automobile Club of France, which is the controlling body in that country, was afraid of the small bore and long stroke high speed engines at that time, and left the organization of these races in the hands of Charles Faroux, one of the editors of *L'Auto*. The following year, the club was sufficiently educated to combine a 183 cu. in. race with its Grand Prix, a two-day event run at the same time. The big cars won but, with a distance of 956 miles, there was a difference of only 3 m.p.h. between the Peugeot of 460 cu. in. and the big

*Mr. Gerster is an eminent French automotive engineer and designer, and Mr. Bradley is European correspondent for AUTOMOTIVE INDUSTRIES.

Fiat of 920 cu. in., and the diminutive 183 cu. in. Sunbeams. It was the most conclusive demonstration of the possibilities of the small engine that motordom has ever seen, and, although the national club did not adopt the 3-liter rule immediately for its Grand Prix race, the lesson was not lost. Had there been a French Grand Prix this year, it would have been for 183 cu. in. cars. The rule will be adopted, however, in 1921 and, in the meantime, Indianapolis has taken it up for the 1920 race on the Hoosier track.

The 183 cu. in. rule had the effect of inducing engineers to work on the problem of obtaining the highest power from an engine of a given capacity. It is rather strange that the 1912 race was won by cars that had the least departures from standard practice ever seen in racing machines.

The 1912 race at Dieppe was won, in the 183 cu. in. class, by Sunbeam cars, which took first, second and third places in their own classes and were beaten only by one Peugeot and one Fiat in the open event. There were other 183 cu. in. cars of higher power and more advanced design but they were inferior in speed to what may be called the standard Sunbeams. This can be accounted for by a lack of preparation. Among them were the first 3-liter

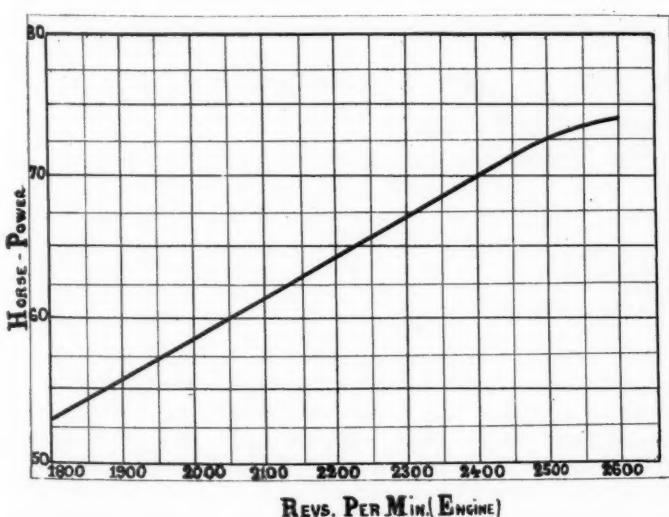


Fig. 1—Power curve, Sunbeam racers

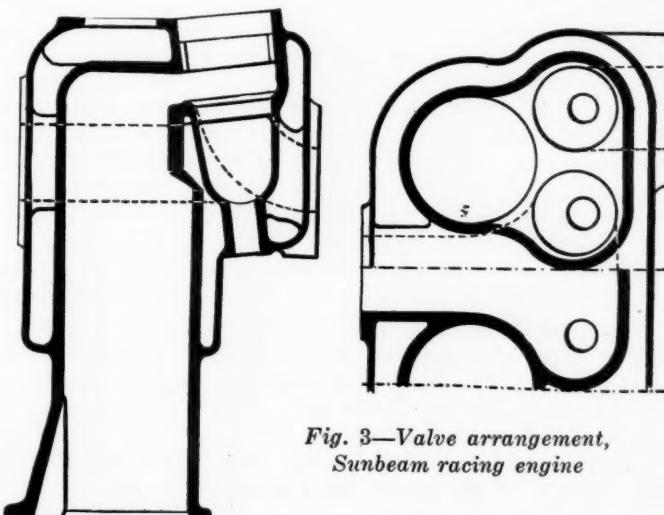


Fig. 2—Cylinder, Sunbeam racing engine

Fig. 3—Valve arrangement, Sunbeam racing engine

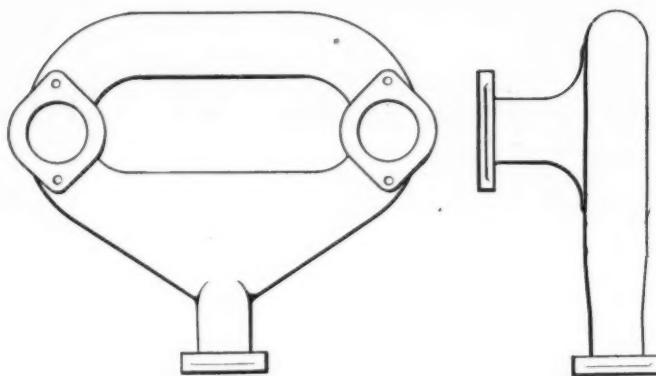


Fig. 4—Intake manifold

Peugeots. Of the same general design as the big car which won the open event, they were defective in several of their details and were not a complete success until the following year. By that time they had been modified and had become the most successful racers in Europe. It was one of these 1913 Peugeots, modified from the 1912 designs, which was run at Indianapolis in 1914 by Duray, when it won second prize against machines of twice its piston displacement. This was the first appearance of a 183 cu. in. racing car in America.

The Sunbeam engines were the simplest entered in the French 1912 race. It is certain that they developed the maximum power obtainable from engines of the L-head type. The cylinders, which were a single casting, measured 80 x 149 mm. (3.15 x 5.87 in.) and the power developed was 74 hp. at 2600 r.p.m., as shown on the accompanying curve (Fig. 1). The piston speed was:

$$n \times c = 2600 \times 0.149$$

$$V_p = \frac{n \times c}{30} = \frac{2600 \times 0.149}{30} = 12.9 \text{ meters/second (2540 ft. p.m.)}$$

ft. p.m.). The volume of charge drawn in per horsepower per minute is as follows:

$$V_1 = \frac{S \times V_p \times 60}{n} = \frac{0.5026 \times 12.9 \times 60}{74} = 52.5 \text{ liters}$$

(3203 cu. in.). This figure is practically the same as that of the racing Peugeot and indicates a higher efficiency for the Sunbeam than for other engines of that period.

The volume of the compression space was 153 c.c., giving a compression ratio of 5.9 to 1. Gage measurement during a test gave 100 lb. p. sq. in., which was a great advance on the results obtained before 1912. The horsepower per liter of cylinder volume was

$$N = \frac{74}{3} = 24.6 \text{ hp.}$$

or, for each cubic inch of piston displacement, the engine developed 0.404 hp. The form of the cylinder and of the combustion chamber are shown in Figs. 2 and 3. The engine was fitted with a Claudel-Hobson C. Z. 38 carburetor and had a gas velocity at the throttle of

$$S \times V_p = 0.5026 \times 12.9$$

$$V_2 = \frac{S \times V_p}{f 38} = \frac{0.5026 \times 12.9}{0.113} = 44 \text{ meters/second (8640 ft. p.m.)}$$

The intake manifold, shown in Fig. 4, was of an unusual shape, being designed to give a circular motion to the mixture, with two ports into each pair of cylinders opening out from the loop of the outer edge. This pipe, which was warmed by the circulating water, had a diameter at the inlet of 45 mm. and the section of the pipe was 50 mm. The velocity of the gas in the pipe was

$$0.5026 \times 12.9$$

$$V = \frac{0.5026 \times 12.9}{0.195} = 33 \text{ meters/second (6480 ft. p.m.)}$$

This arrangement gave complete satisfaction, but the results were obtained only after a very long series of careful tests carried out on the road under the direct supervision of Claudel and Coatalen.

The valves, as shown in Fig. 5, were a special tulip type with hollow head and the underside of the head was specially shaped to give a high volumetric efficiency. The lift was 9.5 mm. and the pressure of the valve spring, with valve opened, was 150 lb. The rate of the spring was 115 lb. p. in.

The crankshaft, which was carried in three plain bearings, had a diameter of 48 mm. It was lightened from the standard type and was made of chrome nickel steel, being balanced accurately during manufacture.

The pistons, shown in Fig. 6, were of original design. They were specially lightened from the steel bar and had a support in the crown to the piston pin. This made it possible to have the head much thinner than otherwise without danger of overheating the head. The skirt was lightened by drilling. The connecting rods were of special nickel chrome, made from forgings, machined all over to a light H-section, which was further lightened by drilling. The connecting rod bearings were lined with white metal run directly into the rods. The cams necessarily were of special shape that gave an increased lift and more rapid opening and closing. The operation of the valves was by means of standard roller tappets.

Great Advance Since 1912

Good as it was in 1912, an engine of the Sunbeam type would have no chance of coming home first in a 1920 race. Since that car was run, piston velocity has increased enormously, mechanical efficiency has been increased, and the power obtainable from an engine of this size has gone up from 72 to more than 100.

When the first 183 cu. in. rule was applied, no mention was made of forced induction. That was an oversight on the part of the organizers of which manufacturers tried to take advantage. The Hispano-Suiza company built engines with two-cylinder compressors to pump the charge into the main cylinders. Various difficulties were experienced and the cars did not start in the race. Sizaire Bros. worked on the same problem and, with a 3-liter engine of 78 x 156 mm., succeeded in obtaining 96 hp. They found it impossible, however, to make any plug stand up for more than three minutes. During the following year, forced induction was forbidden and the experiments dropped. The Indianapolis rules for the present year are also silent on forced induction.

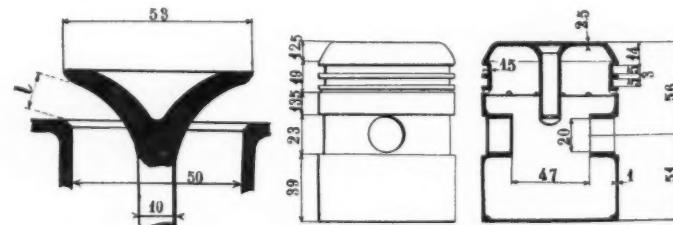
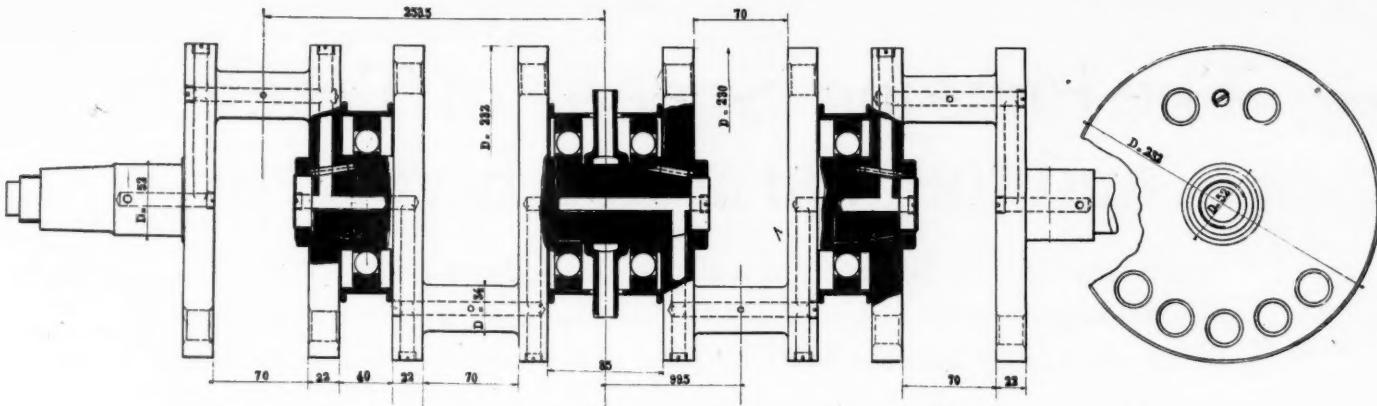


Fig. 5—Tulip type valve used on Sunbeam racing engine

Fig. 6—Sunbeam racing piston, with support in the head

Undoubtedly the best racing results could be obtained with a 2-cycle engine. Such an engine would cost much more to produce than would one of the 4-cycle type. It would have to be built without baffle and with special attention to the intake piping and the intermediate tanks. Although difficult to construct, such an engine is possible of realization and could be guaranteed to develop 190 hp. at 3500 r.p.m., with a gas consumption equal to 14 miles



Figs. 7 and 8—Ball-bearing crankshaft

to the gallon. At present, however, the 2-cycle is not attracting much attention and it is almost certain that none will be seen at Indianapolis.

For racing purposes the best dimensions of a 183 cu. in. engine are 78 x 156 mm. and these dimensions will be adopted by all European contestants. Other possible dimensions are 80 x 149, 85 x 132 and 90 x 118. With piston strokes of 118 or 132 mm., it is impossible to get sufficiently high linear piston velocities necessary for success in racing. With an engine of 78 x 156 mm., a piston velocity of 19 meters/second (3600 ft. p.m.) can be obtained, this being the highest lineal piston velocity with the lowest rotational speed. This velocity of 19 meters/second has already been attained, and figures even run as high as 21 meters/second (4140 ft. p.m.), but at this speed the peak of the power curve had been passed.

With this engine, having a piston velocity of 19 meters/second, the number of revolutions will be

$$n = \frac{30 \times V_p}{C} = \frac{30 \times 19}{0.158} = 3650 \text{ r.p.m.}$$

The volume of gas drawn in per hp. min. will be

$$V_1 = \frac{S^4 \times V_p \times 60}{W} \text{ or } W = \frac{S^4 \times V_p \times 60}{V^1}$$

Regarding the coefficient of efficiency V^1 , it is known that the best engines in 1912 obtained $V^1 = 52$ liters per hp. min. and the Sunbeam obtained $V^1 = 52.5$.

Admittedly much can be gained by engines with four valves in the head and combustion chambers of much better form than was found on the L-head engines of 1911 and 1912. Thus, V^1 can be brought down to $V^1 = 48$, and the horsepower obtainable will be

$$N = \frac{S \times V_p \times 60}{V^1} = \frac{0.48 \times 190 \times 60}{48} = 114 \text{ hp.}$$

Other persons are more modest in their estimates and do not count on more than 108 hp. from the 1920 183 cu. in. engines. From 0.404 hp. per cu. in. in 1912, the power will thus have gone up to 0.623 hp. in 1920.

The compression will probably be more than 90 lb. and in some cases will run up to 100 lb. The volume of the combustion chamber will be

$$V = \frac{V}{p-1} = \frac{750}{6.3-1} = \frac{750}{5.3} = 142 \text{ cc.}$$

and

$$\frac{V}{r} = \frac{750}{142} = \frac{1}{0.189}$$

The mean effective pressure of such an engine will be

$$P = \frac{t \times 75 \times N}{S \times V_p \times N_2} = \frac{4 \times 75 \times 114}{48 \times 19 \times 4} = 9.4 \text{ kg./sq. mm.}$$

(133 lb. p. sq. in.) The horsepower per liter of cylinder area will be

$$N = \frac{144}{3} = 38$$

The gas velocity at the carburetor outlet will be from 58 to 65 meters/second (11,400—12,800 ft. p.m.), but this will be influenced to a certain extent by the nature of the road or track on which the car is intended to run. The intake manifold will be determined by the nature of the valves but will be as short as possible and will have the greatest possible amount of water jacketing.

Probably the majority of this year's engines will have cast iron cylinders, although there is no reason why steel cylinders with a welded jacket should not be used, or aluminum cylinders with a steel liner. In all cases, the engines will have four valves per cylinder mounted in the head and generally operated by a couple of overhead camshafts. In view of the high engine speeds to be obtained, valves and valve followers, if any are used, will be as light as possible.

Method of Driving Camshaft

The most popular method of driving the camshafts will be by means of a train of spur gears, as used on the Peugeot engines first designed by Engineer Henry. This system of camshaft drive was introduced by Henry in 1913, after he had built his first Peugeot racing engine with bevel camshaft drive. The spur pinion type, with the idlers mounted on ball bearings, proved so successful that it was continued on all later Peugeots, and, when Engineer Henry joined the Ballot company, on the cars of that firm. Others have also copied this feature.

The general tendency will be to incline the valves in the head and to use a single spark plug placed in the center of the four valves. Some designers, however, are showing preference for four horizontal valves operated from a couple of camshafts in the crankcase. Experiments have also been made with eight valves per cylinder. With the four-valve arrangement, it is difficult to find room for more than one plug, but tests have shown that, with plugs on opposite sides so timed that the inlet side plug has a lead on the exhaust side one, an appreciable increase in power can be obtained because of more rapid combustion.

There is no indication that positively opened and closed valves will be used. They were employed before the war, but the results obtained were not equal to expectations. As an indication of timing which may be expected on these engines, the following may be taken: The exhaust valve will open with a lead of 60 deg. and will close 10 deg. late.

(Continued on page 764)

The Plowing Speeds of Tractors and the Variables Involved

In this article, Mr. Zimmerman seeks to throw light on the problem of ascertaining the most economical rate for plowing, considering the many factors that enter into the computation. The subject is considered not only from the standpoint of the manufacturer but of the farmer as well.

By Oliver B. Zimmerman*

AMONG the problems before the designers of plowing tractors, none is of more importance than that of selecting the plowing speeds. As the variables involved are numerous and elusive, only by careful analysis and experiment can we ascertain their relative importance and make a proper deduction.

The problem is to ascertain the most economical plowing speed for first-class work, and the solution must be right from the standpoint of the manufacturer as well as from that of the farmer. This means that we must consider a variety of soil resistances, widths and depths of cut, forms or shapes of plows, etc. In this review most attention will be devoted to the question of what happens to the power delivered at the draw bar and it will be necessary to assume certain standard conditions.

First, let us take a high angle view of the situation, in order to simplify our analysis, using two well-designed outfits, developed to travel at 2 and 4 m.p.h. and to draw four and two bottoms respectively. If we assume for the moment that the draw-bar horsepower are equal and the acreages plowed in the same time are equal, the following conclusions can be drawn:

(a) The tractor must move itself and the plows over

*Paper read at the S. A. E. tractor meeting at Kansas City, Mo., Feb. 19. Mr. Zimmerman is of the International Harvester Co.

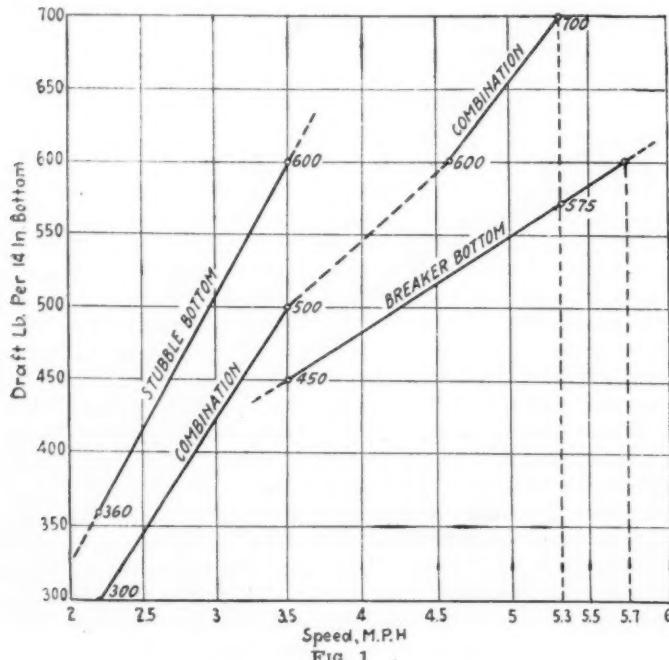


FIG. 1

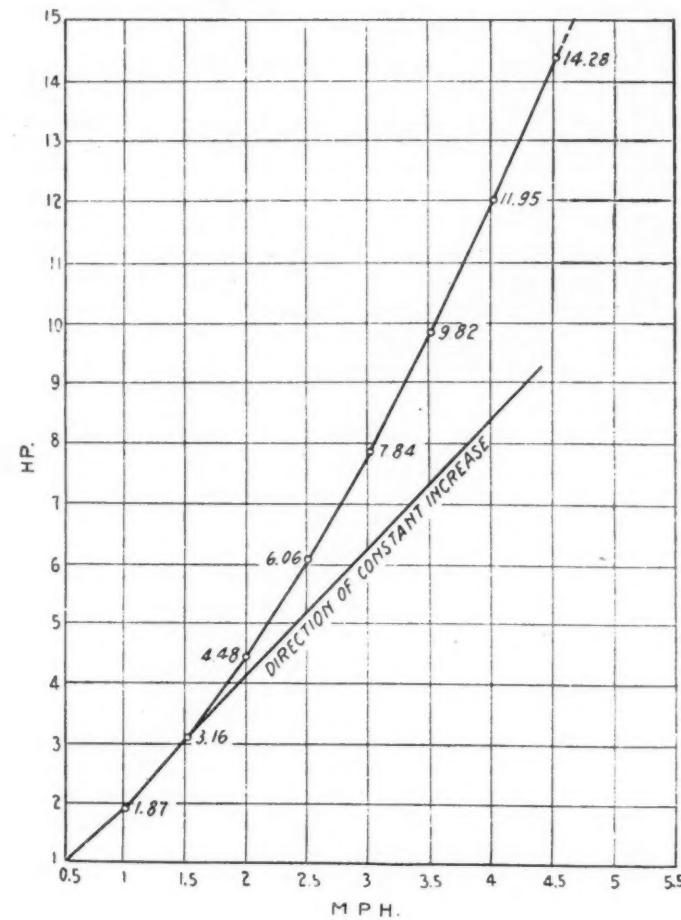


FIG. 2

the ground twice as far in one case as in the other.

(b) The number of turns at the end is twice as great in one case.

(c) The strains due to striking hidden obstructions are greater at the higher speed.

These are the factors which, in the main, require more horsepower ahead of the draw bar at the higher speeds as well as proper care in design.

Next let us consider what occurs to the rear of the draw bar. Here we shall assume, in order to cover a reasonable variety of soil resistance and number of plows, that we have a draw-bar horsepower of 15 available. We shall assume that for each speed from one mile per hour up to five or six the engine and tractor are properly designed for the speed considered and of equal fuel economy

per horsepower above and below each mile of speed, so that the merging shall be complete and uniform from one into the other and the comparison as fair as possible.

As for the basic data we shall use the recently published draft data of Professor Davidson of Ames, Iowa, and that of the Kansas State Agricultural College, as these tests are in complete agreement with experimental data developed by experienced commercial organizations in the past and used by them in present-day designs. The data mentioned in general indicate that in each kind of soil, whether heavy or light, with the increase of speed there is a corresponding increase of draft, the amount dependent on the speed, shape of plow and nature of soil.

Referring to Chart I, the plows show a uniform increase in draft with increase in speed. In other words, the draft is represented by a straight line. The combination bottom was experimented with at two speed ranges. Bear in mind that the soil resistance is very small in these Kansas tests. It is shown that with a stubble bottom in light soil, an increase of 1.3 miles above 2.2 miles carries a draft increase of 240 lb., or 59 per cent increase speed causes a 75 per cent increase in draft. With the combination bottom a 59 per cent increase in speed causes a 66 per cent increase in draft. With the breaker bottom, a 63 per cent increase in speed (3.50 to 5.7) causes a 33 per cent increase in draft (450 to 600).

The deduction is that with an increase in speed there is a proportional increase in draft; also that the less abrupt moldboard has the least resistance. The same is shown in Professor Davidson's data (see Chart II) where an increase in speed from two to four miles, or 100 per cent, causes a draft increase of 33 per cent.

Horsepowers Required

Let us next take up the horsepower required and translate the factors of speed and draft into power. It will be noted that not only must we accomplish the work due to the added speed, but in addition we must take care of the

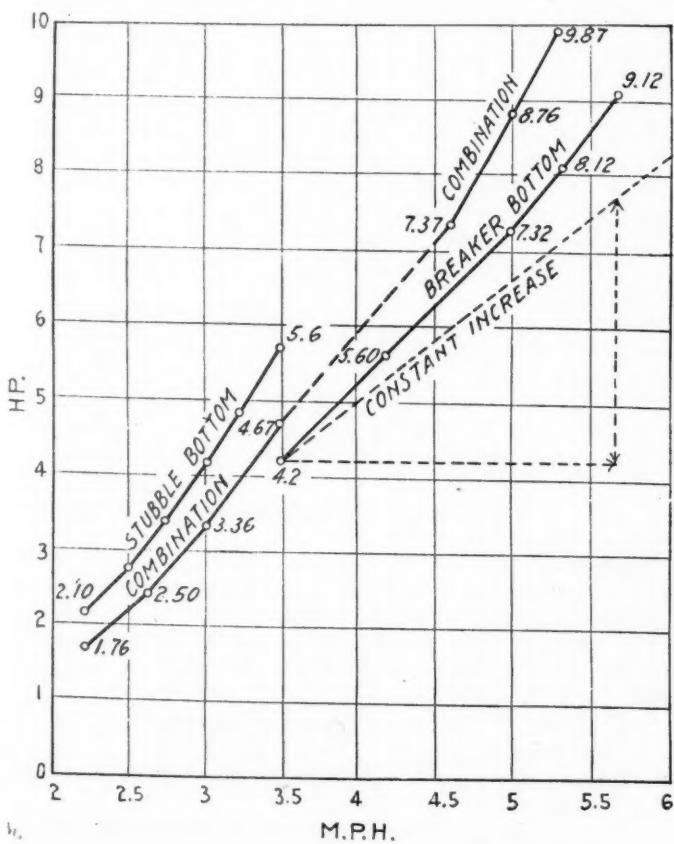


FIG. 3

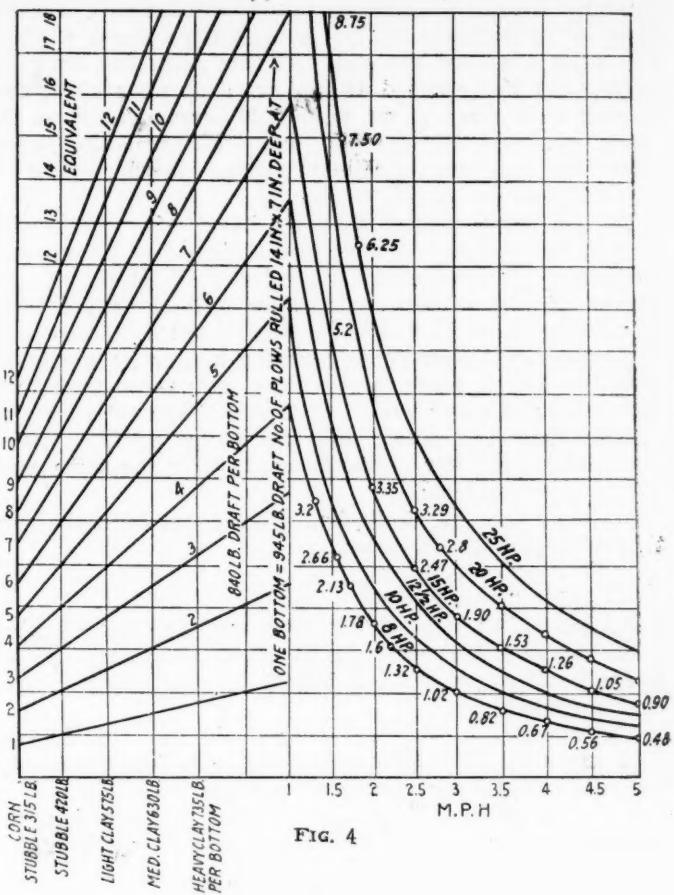


FIG. 4

added percentage of draft. Hence, we find that increasing the speed 100 per cent, from 2 to 4 m.p.h., requires an increase in horsepower of 267 per cent, from 4.48 per plow to 11.95.

Chart III is a diagram of horsepower required, illustrating the relations for the Kansas tests. Chart IV was developed from the tests giving a comparison of various sizes of tractors operating at various speeds and in soils of various resistances. Data was obtained by determining how many plows the tractor would pull at the various speeds.

By cross-reading from any given soil resistance at the left and from a point indicating the number of plows, the speed at which they can be pulled is shown on the curve (575 lb. soil resistance at 2 miles—4 plows—15 hp. curve—reads $2\frac{1}{2}$ miles).

Likewise a given tractor speed followed to the curve, then to the left intersecting a vertical line, records the full number of plows that can be pulled in that soil (2 miles—10-hp. curve—630-lb. soil resistance at 2 miles, 3 plows).

Acres Plowed per Day

With the data plotted in the previous charts, based on careful tests in light soil, we are now enabled to diagram the acreage plowed per hour by the tractor at various speeds and in various soils (Chart V). By calculation, the curve, swinging down and to the right, represents the curve of the maximum area or acreage which can be turned economically at the speed shown, in the soil indicated and with the designated 15 hp. Intersecting this curve are various radial lines designating the path on the field of various numbers of plows cutting 14 in. width.

The saw tooth lines indicate the following:

A 15 draw-bar horsepower engine, in this soil, starting at 2 m.p.h., would begin by plowing at the rate of 2.2

acres per hour. The acreage would increase with increase of speed up to 2.50 acres per hour, when a speed of about $2\frac{1}{4}$ miles has been reached. At this point the draw-bar horsepower has reached 15 and we drop off a plow, continuing with seven plows, from 2.20 acres. Again as the speed advances the acreage increases until the seven-plow line cuts our maximum when another plow is dropped, and so on.

Let us now consider that we have three tractors at work under the same conditions and draw-bar horsepower, operating 3, 4 and 5 plows, respectively (C, D, E), at such speeds as will cause each to plow 1.47 acres per hour. What can we see from the location of these three points:

First—The 3-plow rig is working nearer its maximum than the 4 or 5, since the distance from the maximum is increasing; in other words, C, D and E are not requiring 15 draw-bar horsepower and the 5-plow outfit is using the least horsepower of the three, to plow the same acreage in the same time.

Utilizing the full 15 db. hp., the acreage is in the relation of 3 plows, 1.54 acres.

4 " 1.78 "
5 " 1.97 "

Again, taking point F, a 2-plow outfit operating at four miles covers 1.13 acres while the same outfit fitted with 8 plows would cover, at 2 miles, 2.22 acres or nearly 100 per cent more acreage.

The maximum condition using 15 db. hp. with 2 plows 1.25 acres, while with 8 plows we have 2.48 acres—approximately 100 per cent more acreage.

It is, of course, admitted that this diagram does not compensate for increased weight drawn of the 8 bottom

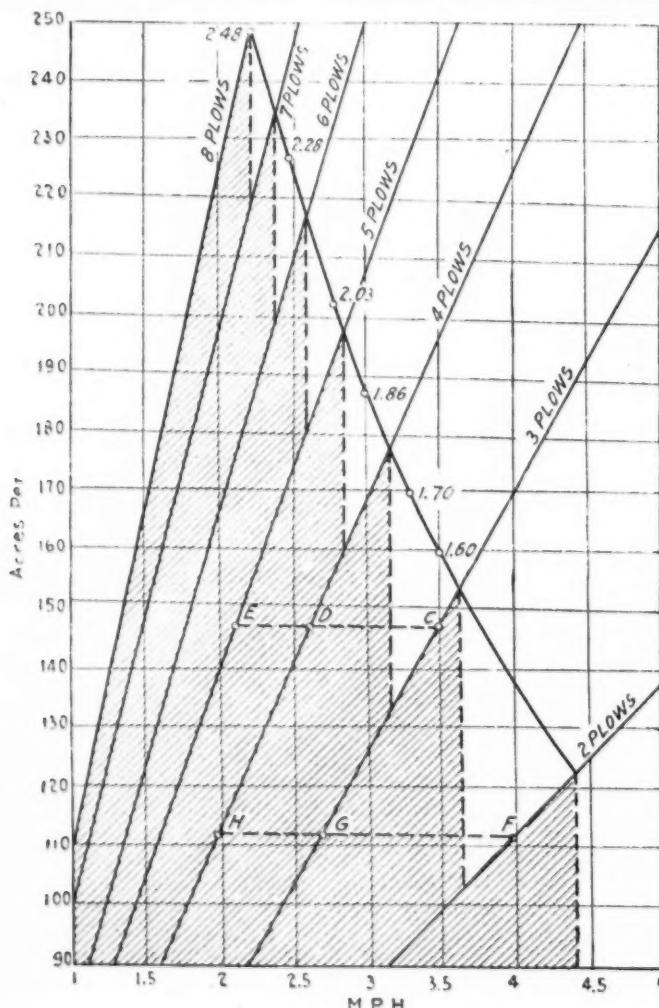


FIG. 5

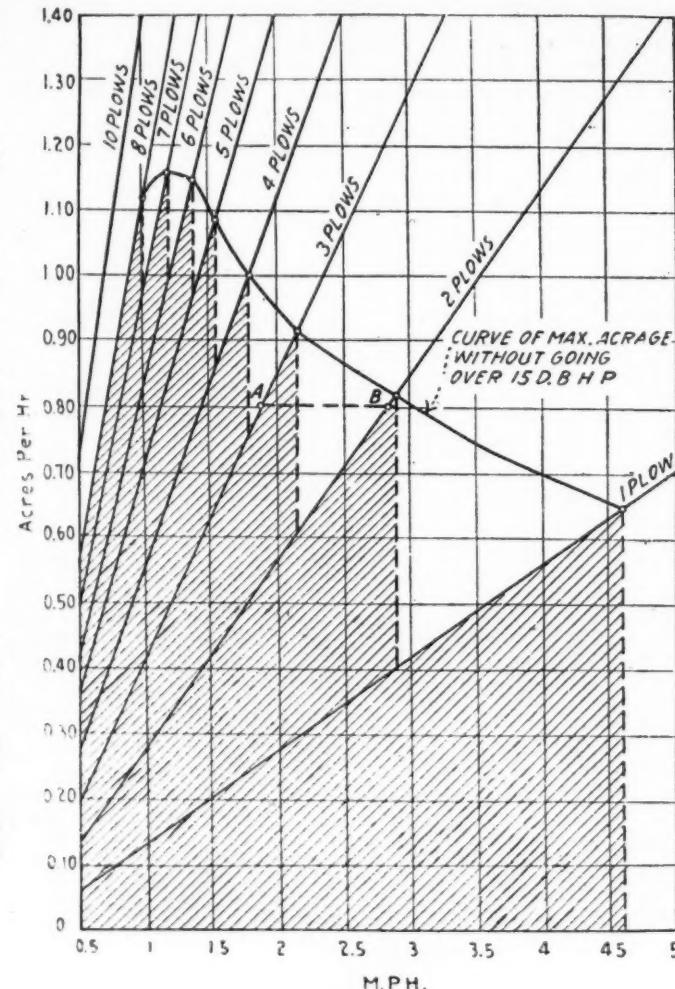


FIG. 6

over the 2, nor for the fact that the plow shape is not correct for the widely different speeds; nevertheless, it is positive that as we decrease the comparative speeds so that the two are only small percentages above and below the designed speed for the plow and conditions, same relation holds true. The corrections mentioned would tend to reduce somewhat the acreage at the lower speed to an extent covered by the power absorbed in hauling the added weight of the greater number of plows over the ground, and the greater speeds would reduce the available plowing energy.

Where heavy land is under consideration we have much the same conditions met and analyzed. It is clear from both Chart V and Chart VI that the acreage plowed decreases markedly with increase in speed, to such an extent that correction in moldboard design or reductions in weight cannot overcome the deduction—that the lower speeds are more desirable than the higher speeds. It is also clear that time is not gained by high speeds; in fact time is lost.

Occasional analysis of field demonstrations has led to wrong conclusions because of the fact that the machines compared are not being compared on an equal basis, a condition quite impossible to attain except theoretically as shown. Let us take two cases to illustrate this in heavy land:

Engine No. 1 pulling 3 plows in low gear at 2.2 miles covers 0.92 acre.

Engine No. 2 pulling 2 plows in plowing gear at 2.75 miles covers 0.80 acre.

Engine No. 1 pulling 2 plows in plowing gear at 2.75 miles covers 0.80 acre.

Engine No. 2 pulling 3 plows in low gear at 1.75 miles covers 0.75 acre.

This shows that the ability to win, say in a plowing contest, is dependent on the relations which exist at the time, not necessarily of the efficiency of the engine and outfit, but the relations of the possibilities of adjusting the speed and number of plows so as to operate close to the line of maximum acreage.

In the above case the low speed wins once and loses once, but if a speed of 3 miles or over were attempted by either tractor in this land it would be unable to pull more than one plow. Similar comparisons on Chart V are more in line with experience, as the deductions are clearer, though this soil resistance is less than usually obtains. Chart VII combines the various acreages with the different bottoms in one diagram.

Aside from the correct answer to the proper plowing speed, there comes up the question of desirable speed for hauling equipment such as threshers and wagons over the road, the drawing of mowers, binders, and similar farm equipment in operation. The answer to this question is outside of our discussion. To be sure, new apparatus could and will be designed for higher speeds, but it must be evident to those with experience that the percentage of increase in economic workable speeds cannot be far from those deduced from this analysis.

Chart VIII is based on cost data in conformity with tractor experience, as follows:

(1) First cost of 25-hp. tractor, plows, tanks and supplies—constant \$2,500.

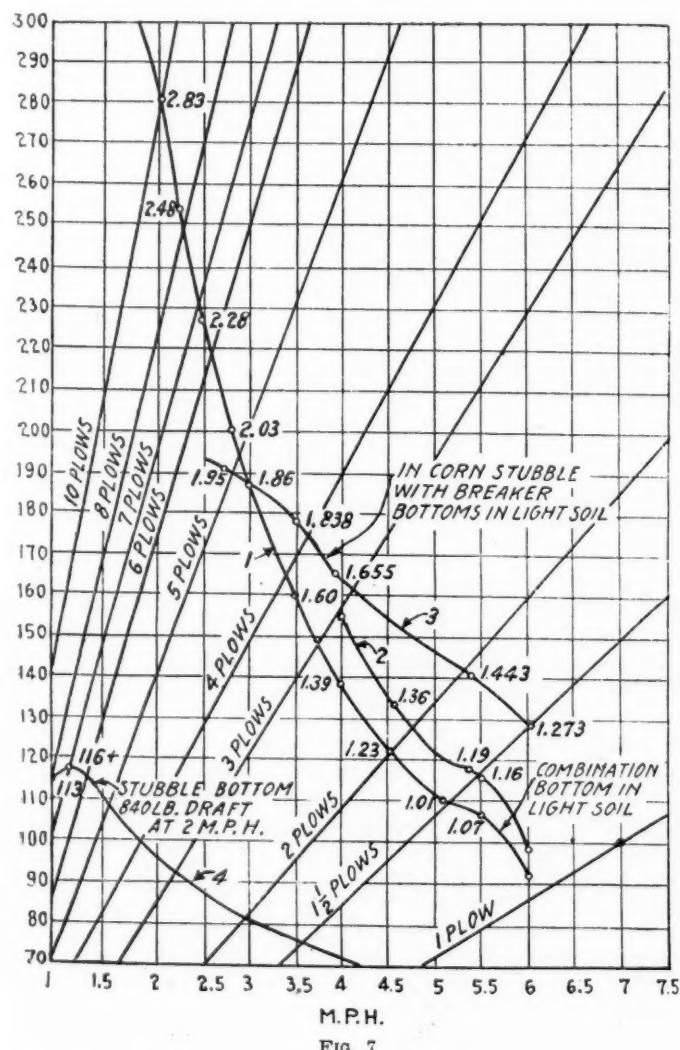


FIG. 7

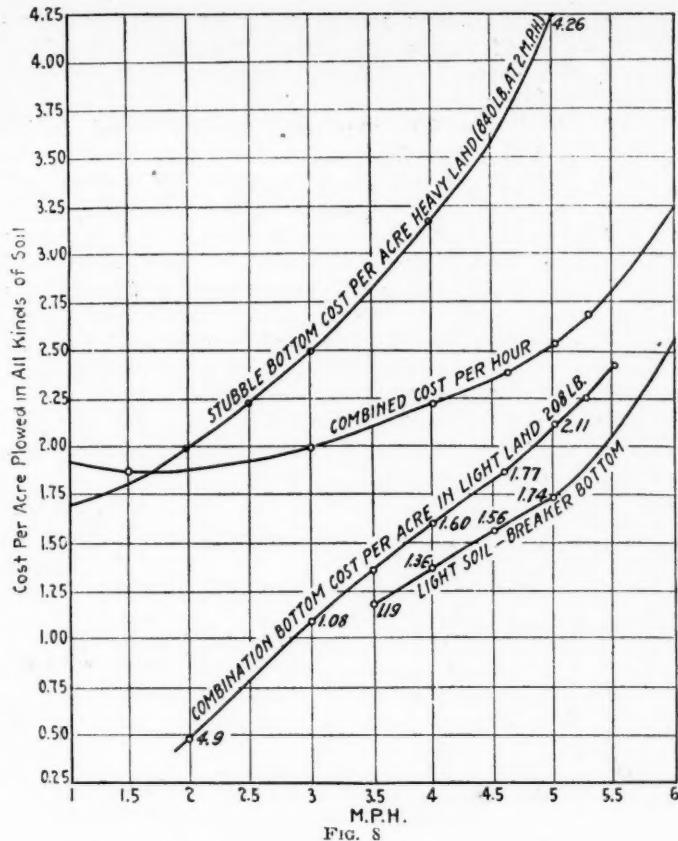


FIG. 8

- (2) Interest on the investment—5 per cent.
- (3) Depreciation on the basis of $8\frac{1}{2}$ years at two miles to 6 years at four miles.
- (4) Repairs—on an increasing rate from 6 per cent at two miles to $8\frac{1}{2}$ at four miles.
- (5) Labor—40c. per hour and 30c. per hour for helper on tractors of over four plows.
- (6) Fuel and lubricant at market prices, on the basis of 5 per cent increase for each mile per hour speed increase and 65 per cent transmission efficiency at the draw bar.
- (7) Hours of operation to be figured at 500 per year. (U. S. Government records).

It is clear here that the cost rises rapidly with the speed.

The same facts have been used in Chart IX, introducing the two-man operator feature and charging actual cost of plows used, engine and equipment as compared to the constant cost illustrated in Chart VIII.

In Chart X are combined a complete development of draft curve, horsepower curve, and number of plow curve with relation to miles per hour.

From the above we can draw the following conclusions:

- (1) The most economical plowing speeds are unquestionably below 3 m.p.h., the cost rising rapidly from around 2 m.p.h.
- (2) None of the variables which have been left out of this discussion can enter into the question to a degree which will overcome the evidence indicated by these charts.
- (3) If plows were designed specially for higher speeds, the best that could be expected would be a less pronounced increase in costs, and in no case could the speed of maximum economy be raised to over 3 m.p.h.
- (4) It is evident that the better breaking up of the soil at the higher speeds is heavily paid for and

that it is more economical to perform the operation of harrowing, either separately or behind the plows than to try to accomplish it by rapid plowing.

- (5) To attain the very best results, speed ratios should cover the ranges from $1\frac{3}{4}$ to 3 m.p.h. This would permit of meeting the various soil resistances (see Chart IV).
- (6) From Chart VI it would appear that in heavy land and plowing up to 8 in. deep with small tractors, greater acreage would be attained by the use of 10-in. or 12-in. bottoms than of 14-in., since more of the saw tooth points will meet the economical acreage curve. A better adjustment of cutting width is also possible.
- (7) The time required to plow one acre can be tabulated from these tests with relation to the number of plows pulled, as follows:

Number of Plows.	Heavy Land, Hours.	Light Land, Hours.
2	1.212	.643
3	1.095	.565
4	1.000	.506
5	.926	.462
6	.....	.426
7	.....	.400

- (8) The low limit of plowing speed is obviously that which will permit of scouring of the moldboard. This speed will be dependent on soil conditions. The proper moldboard is assumed to have been chosen, i.e. one whose abruptness and scouring qualities are correct for the various conditions to be met.
- (9) The cost curve for two operators at low speeds and with five or more plow bottoms can be further cut by using power lift equipment, when one man can operate up to eight bottoms.

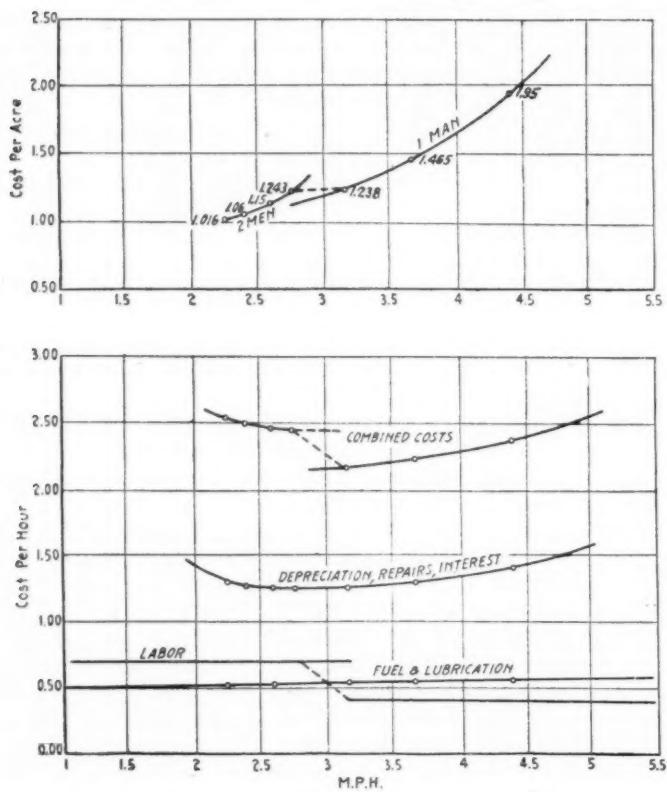


FIG. 9

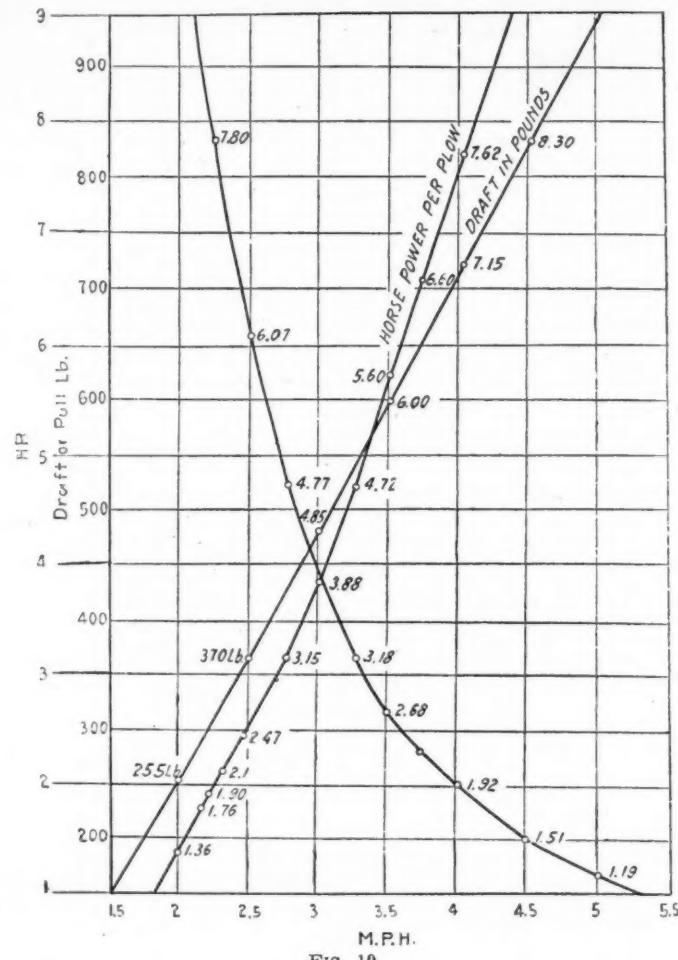


FIG. 10

Design of the 183 cu. in. Engine

(Continued from page 759)

The intake valve will open 10 deg. after upper dead center and will close 40 deg. after lower dead center.

Nearly all the 3-liter racing engines of the present year will have built up, balanced, ball bearing crankshafts. One of these shafts, as used on a European car being prepared for Indianapolis, is shown in Figs. 7 and 8. This shaft is carried in three ball bearings, the center being double. In addition there is a ball bearing ahead of the timing gears. The webs are balanced by being drilled and filled with lead and aluminum. Generally the ball bearings used on racing engine crankshafts are overloaded from 35 to 40 per cent on the figures given in the makers' catalogs. In one French aviation engine the overload, according to the figures in the maker's catalog, is 230 per cent.

Connecting rods will be of chrome nickel steel and either of I-section, machined all over and lightened by drilling, or tubular. White metal will be run in direct. Aluminum alloy pistons will be used in preference to steel. Use will be made of a single, double-convolution steel compression ring, in place of cast iron rings.

The fastest cars at Indianapolis may be expected to have a maximum speed of about 98 m.p.h. and to be capable of averaging 85 m.p.h. for the 500 miles. The maximum speed is considered with the cars in racing trim for long-distance work and not with special stream-lined single-seat bodies and small tanks for a run of five or six miles. Few of the machines will be exactly of the minimum weight, although in some cases this weight will not be greatly exceeded. The low weight in relation to horsepower makes it difficult to produce cars which will hold to the road as well as the bigger and heavier machines.

Motorizing the Farm with Tractor, Cultivator and Truck

The tendency of tractor builders to add trucks to their lines is noted in this article, which gives also the figures of a recent incomplete governmental attempt to take a census of the farm-owned trucks in this country. The total of 50,000 such machines, however, is considered too low.

IT became known at the recent Kansas City show that several of the tractor manufacturers had completed plans for building trucks as a sales complement for the tractor and implements. This policy follows the belief that the motorized farm should have:

A tractor; a motor cultivator; a truck.

With this equipment a considerable part of the heavy farm work is motorized. Some persons who have been keeping in close touch with farm developments suggested that, in addition to the motor equipment mentioned, the farmer should have one of the garden cultivators for use in the truck patch and other small work. This suggestion usually brings a debate, as some of the foremost tractor engineers are not ready to declare for the horseless farm. As one of them said to AUTOMOTIVE INDUSTRIES:

"I am not planning for the horseless farm, because I firmly believe that a horse or horses will always find a home on the farm, through sentiment if for no other reason. But we have not yet solved all of the problems of the farm. There is the hay and wheat hauling, for instance. The motor cultivator is useful for this work, but the tractor is too heavy and is needed for threshing power. The truck, however, is certain to come."

This brings the question back to the truck and the farm sales possibilities. In the talk at Kansas City there appeared to be a lack of figures on which to base estimates of the present and future use of trucks. The generally expressed view was that the farmer strongly favored a truck of less than two tons and the tractor manufacturers apparently are going in for these sizes. It was generally predicted that trucks made by tractor manufacturers would be a part of next year's tractor show.

In this connection the following information just released by the United States Department of Agriculture is of especial interest. It probably is the first attempt at a census of trucks on the farm. Its approach to correctness is explained in the statement:

"At least 50,000 farmers in the United States own motor trucks which they use on their farms. This is shown by a

preliminary survey of the ownership and use of motor trucks by farmers undertaken by the Office of Farm Management and the Bureau of Crop Estimates of the United States Department of Agriculture. The data secured by this inquiry answer many questions which have been asked repeatedly in recent years regarding the extent to which motor vehicles are used for farm hauling.

"The figures on which totals for the nation and the several States are based were secured from approximately 35,000 selected crop reporters of the Bureau of Crop Estimates. These co-operators were asked to report the names and addresses of farmers they knew who own motor trucks for farm use. Pleasure cars and trailers for use with pleasure cars were excluded, and the reporters were asked not to take account of trucks which are used primarily for general custom hauling, or on regularly established routes.

"This survey can scarcely be considered a complete census, for it is probable that in some localities the crop reporters were not acquainted with all the truck owners, but it is certain that a very large per cent have been listed. It is believed that in no State were less than 75 per cent of

the trucks reported. If not complete in every respect the figures show the relative distribution very satisfactorily.

"The exact number of motor trucks reported is 49,195, divided among the States as follows: Alabama, 847; Arizona, 95; Arkansas, 721; California, 1019; Colorado, 804; Connecticut, 357; Delaware, 100; Florida, 380; Georgia, 1808; Idaho, 329; Illinois, 2261; Indiana, 1548; Iowa, 2773; Kansas, 1732; Kentucky, 818; Louisiana, 310; Maine, 435; Maryland, 596; Massachusetts, 661; Michigan, 1636; Minnesota, 1255; Mississippi, 957; Missouri, 2065; Montana, 359; Nebraska, 2739; Nevada, 41; New Hampshire, 283; New Jersey, 862; New Mexico, 104; New York, 3171; North Carolina, 1450; North Dakota, 501; Ohio, 2261; Oklahoma, 723; Oregon, 369; Pennsylvania, 2760; Rhode Island, 152; South Carolina, 1190; South Dakota, 1708; Tennessee, 978; Texas, 1668; Utah, 173; Vermont, 282; Virginia, 1128; Washington, 682; West Virginia, 465; Wisconsin, 1465; Wyoming, 174."



The above photograph illustrates a development taking place throughout the Middle West. It shows a Kansas garage for automotive equipment. The tractor now has a companion, the truck, the tile house being erected with two compartments

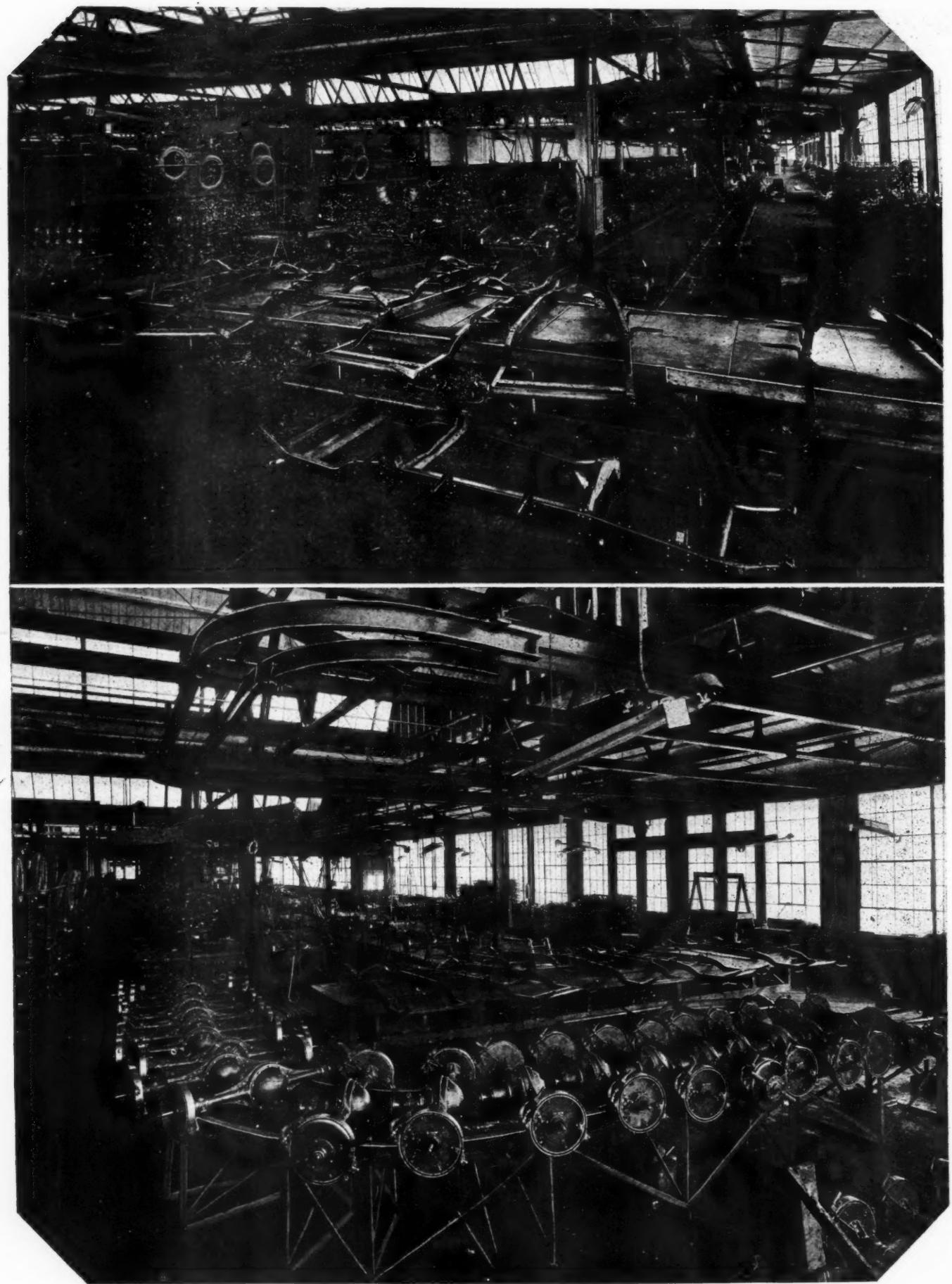


Fig. 1—Start of Essex production line showing finished stock storage space beneath elevated platform on left.
Fig. 2—Axles approaching beginning of chassis assembly line on gravity conveyor

Speed in Production and Economy in Space Possible in Assembly Line

The efficiency of this last series of operations in car building depends upon many factors, some of which have been eliminated in the plant described here. The general layout is applicable, of course, to many other factories and the article should be read with the idea in mind of speedier production.

By J. Edward Schipper

UNDER the present difficult conditions as regards plant expansion, space economy becomes a prime consideration. In laying out the new assembly plant for Essex cars, this has been given consideration, with the result that a considerable saving has been effected and an advantageous assembly line was obtained. Space generally is lost on account of the necessity for having the finished stock storage along the assembly line at points adjacent to that at which the assembled part is mounted on the chassis or body. This finished stock storage space naturally takes up considerable room, so that an assembly floor is not completely available for production.

The difficulty has been largely solved in the Essex plant by running certain parts of the assembly on a platform and using the space beneath this platform for raw stock storage. The plant itself, taken as a whole, is exceptionally efficient. There are three chassis assembly lines and two body assembly lines. The total capacity is 250 cars in an eight-hour day. The productive force numbers 353 men, giving a total of 2824 man-hours daily on assembly work. Taking into consideration the productive force alone, this gives 11.3 man-hours per car assembled, including both chassis and body assembly.

On the chassis assembly alone there are about 120 men on all three lines, giving a total, on an 8-hour basis, of 960 man-hours for the 250 chassis. This gives an average of 3.8 man-hours per chassis assembled and indicates a high standard of efficiency, due largely to the complete mechanical movement of all the parts. From the time it starts along the line there are no manual transfer movements necessary for the chassis.

The building in which these operations are carried on is a single story, saw-tooth type, 340 ft. wide by 400 ft. long, providing 132,000 sq. ft. of floor area. There is a corner, 40 x 100, taken out of this building. Of this total, 21,000 sq. ft. are on an upper tier, which is used for certain phases of the assembly work. The space beneath this platform is utilized for storage of finished parts at points properly placed along the assembly line. Thus, without a material increase in building expense and with all of the advantages of a single story, saw-tooth construction as far as light is concerned, this arrangement of Essex assembly still permits of the use of almost the total projected area for assembly, and also allows convenient storage for finished parts.

The building is up-to-date as regards lighting. The side walls are almost a solid expanse of windows, and the room has a double, saw-tooth roof, allowing light to fall directly upon the assembly line. The roof construction is such that a great area can be thrown open to per-

mit efficient ventilation of the entire floor space. In this building are housed the assembly chains, paint ovens, final tuning-up testing drums and the export and domestic shipping facilities.

In connection with the export shipping room, it is interesting to note that the construction of the crates has been placed on a progressive basis employing the same principles as progressive assembly in the automobile plant. The use of portable trucks for handling frames and chassis has been rendered unnecessary by the completeness of the assembly chain system. There are two cross-overs necessary along the line, these having been taken care of by overhead cranes. The parts which have been elevated are the second chassis paint ovens, the wheel painting department, lockers and some of the offices and wash rooms.

The general layout of the three chassis assembly lines is such that assembly is practically uninterrupted. Each is 194 ft. in length, the lines running parallel. A line consists of three sets of chains, and one of the features of the layout is that the platform, upon which the chassis is carried during the assembly steps, is returned by the chain itself through a tunnel under the floor. It is not necessary to truck the empty frame back to the beginning of the line. This saves a considerable amount of confusion and floor space.

At the ends of the first lines, an overhead crane picks up the chassis and transfers it to the overhead platform containing the paint ovens, and after the chassis emerges from these ovens on the conveyor, the wheels fitted with tires are attached, and that much of the assembly is taken over to the final assembly line. At that point, the body assembly, which enters at right angles to the chassis assembly, has been completed and the two are joined and go on together along the final assembly line until at the end the car is cranked by its own starter and rolls over to the final testing drums. The entire journey from the time the frame is placed on the conveyor until the car is ready for its final test averages 6½ hours.

With this general outline in mind, the progress of the chassis is quite readily understood. Fig. 1 shows the platform upon which are placed the bare frames with the runningboard steps riveted upon them. It is here that the chassis starts on the journey upon which it travels at the rate of 33.5 in. per min. The rear springs and axles are the first important units to be attached and Fig. 2 shows the rear axles entering at a point adjacent to the beginning of the assembly line. The axles are carried on a gravity conveyor, which is kept full to supply the assembly line. At the end of the first assembly line, which can be seen in the background of Fig. 1, the chassis frames

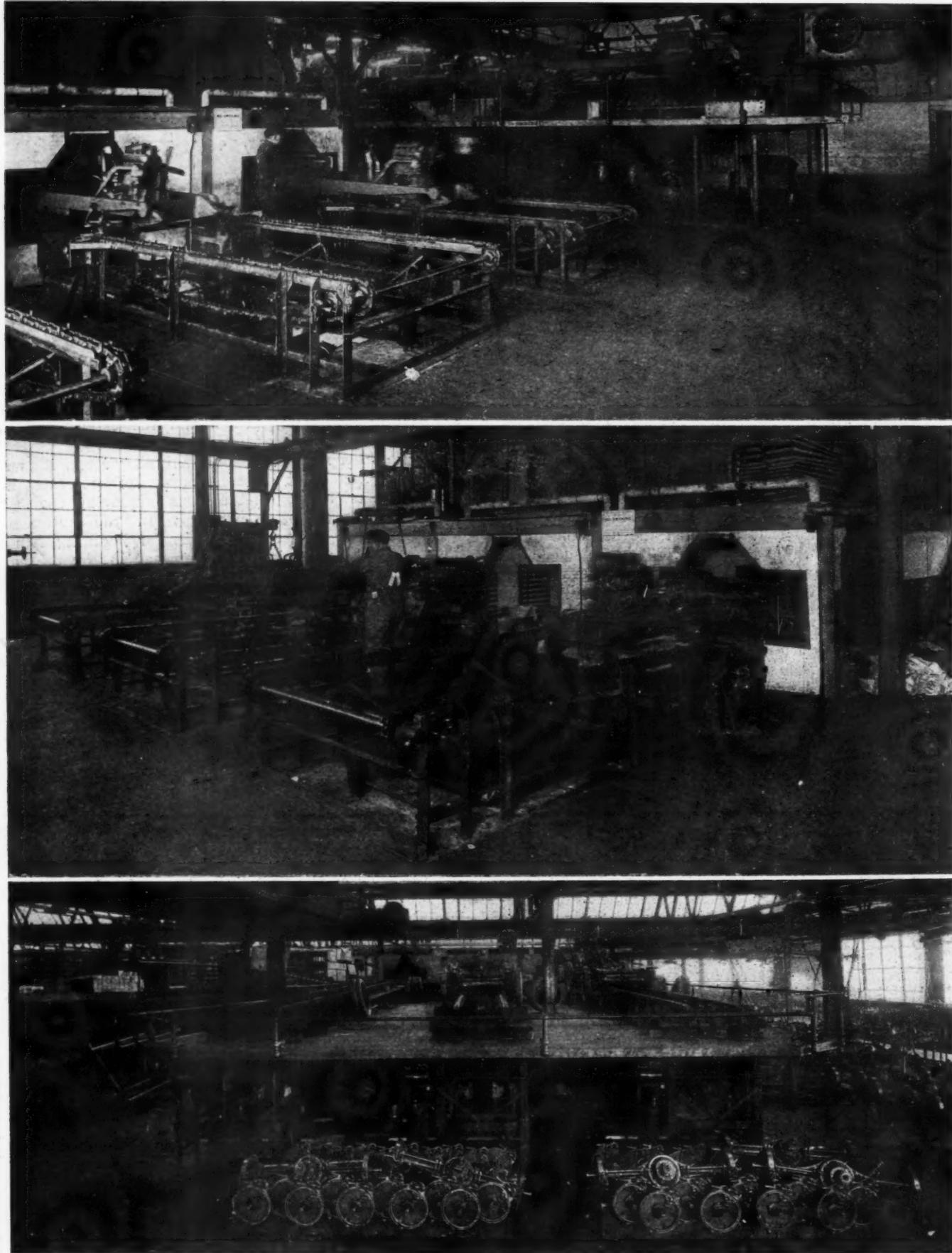


Fig. 3—End of first assembly line, showing chassis emerging from drying oven, where they are lifted by overhead crane to platform and again sprayed.

Fig. 4—Chassis leaving drying oven for transfer to upper platform

Fig. 5—Chassis leaving second drying oven on platform ready to be fitted with wheels

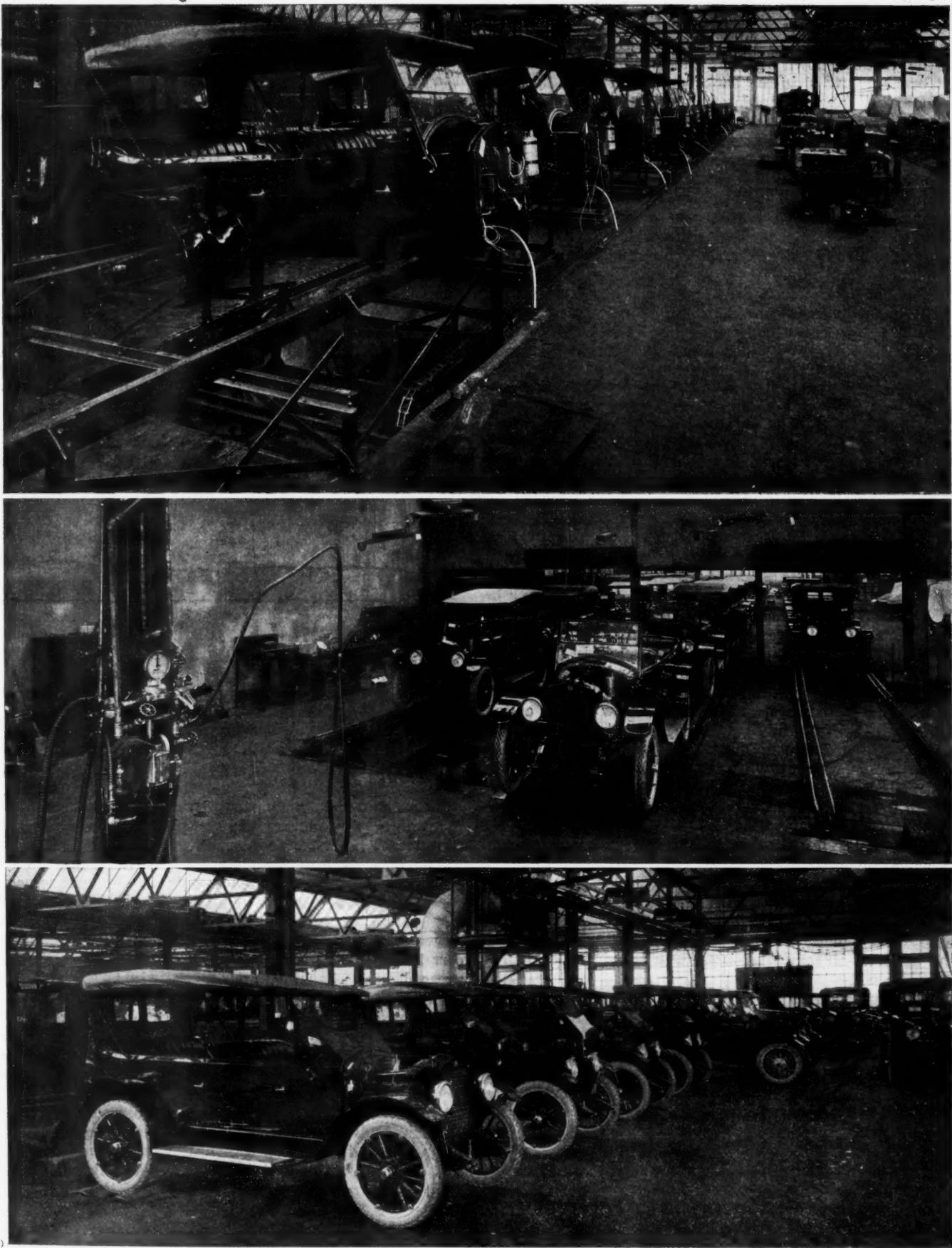


Fig. 6—Completed bodies approaching the final assembly line

Fig. 7—Completed cars leaving the final assembly track

Fig. 8—Cars receiving final tests and tune-up on rear wheel roller testing blocks

enter the first drying oven, having been sprayed at the entrance. They emerge from these ovens at the end of the first line, as shown in Fig. 3. They are then lifted by the cranes shown in that illustration to the raised platform illustrated in the background and again sprayed. The exhaust fans for taking the paint vapor away from the workmen are as shown below the spraying position and, after the spraying is complete, the chassis start through the drying ovens on the platform.

The drying oven on the platform runs practically the entire length of the chassis chain on the elevated section of the floor. As soon as the frames emerge from this second drying oven, they have the wheels attached and they are again picked up by the crane and transferred to the final assembly line.

In the meantime, the body assembly has been taking place along two lines running at right angles to the final assembly line. These body assembly lines are 100 ft. in length and move at a speed of about 28.2 in. per min. Approximately 23 men are employed along each of the body lines. On an 8-hour basis this means about 1.4 man-hours per body assembled. Of course, these figures cover assembly work only and do not include the time on sub-assemblies, or on the manufacture of any unit.

The bodies move along the line illustrated in Fig. 6 until they reach the stage shown in the foreground of this

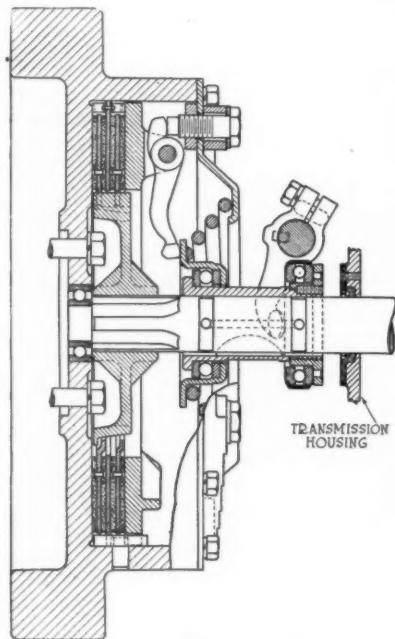
illustration. They are then picked up by an overhead crane and set down upon the completed chassis on the final assembly line. This line carries the cars through to completion, and Fig. 7 shows the finished car coming off the end of the line, where it is started by means of its own electrical equipment and driven to the final test drums illustrated in Fig. 8. On these drums, which are driven by the rear wheels, the car can be operated in the same manner as on a road. The operator can walk around the car, listen to the axles or the engine, and make minor adjustments while it is running. The time consumed in making this final drum test on a car is variable, but averages about 45 min. The speedometer and other units on the dash are in operation in the same manner as if the car were on the road. After the final test and tuning-up, the car is ready for shipment.

The balance of the plant and the efficiency of the layout are illustrated by the relatively small number of non-production or stock men as compared with the production department workers. On the particular day this count was made there were 353 production men and 98 stock men. This gives a total personnel of 451 men assembling 250 cars per 8-hour day. The car weight averages 2700 lb., the phaeton model weighing 2600 lb., the roadster, 2560 lb., and the sedan, 2900 lb. At the present time the ratio is in favor of the open models.

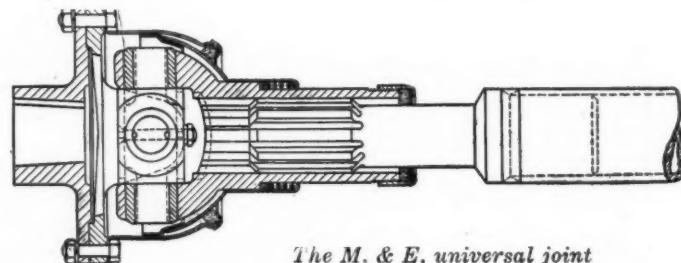
New Merchant & Evans Clutch and Oil-Tight Universal

A DRY disk type of clutch specially designed for installation in unit power plants has been developed by the Merchant & Evans Co. This clutch is made in two sizes, one suitable for engines up to 30 hp. and the other for engines up to 60 hp., the former being 10 in. and the latter 12 in. in diameter. A sectional view of the clutch is shown herewith and it will be seen that it has one driving and two driven metal disks and four asbestos fabric linings so that when the clutch slips friction is developed at four surfaces. The spring pressure is multiplied in a ratio of about 1 to 4 by means of three double-armed levers, the long inner arms of which are acted upon by a volute spring.

The most interesting feature of this clutch is the method of adjustment. There are three set-screws extending through the back cover plate near the circumference, against the inner ends of which the short arms of the clutch levers act. These screws extend through curved slots in an adjusting ring having a stepped surface on its outer face. Adjustment is effected by loosening the three screws, turning the outside ring about one inch clockwise, and then tightening



Sectional view of new
M. & E. disk clutch



The M. & E. universal joint

up the screws. This operation insures uniform adjustment on all three levers and can be accomplished in a few minutes.

The M. & E. universal joint, which was described some time ago, when it was made only in the grease-packed form, now is also made in an oil lubricated form. This latter form has oil-tight washers at the end of the sliding sleeve and in the hub of the pressed steel housing, an anti-dirt hemp packing in the groove of the outer member of pressed steel housing and an oil-tight leather sleeve between the two members of the housing.

We are informed that samples of this oil lubricated joint have been run 30,000 car miles at speeds up to 40 m.p.h. in all kinds of weather, the joints working up to an angle of ± 15 deg., without loss of oil or injury to the packing. The inside leather sleeve is depended upon to retain the oil in the case, the outside packings only serving to keep out dust and grit. The oil is introduced into the housing through a radial hole in the shaft where the tubular portion joins the solid portion, which radial hole runs into an axial hole through the "solid" portion of the shaft.

A Correction

A RECENT article in AUTOMOTIVE INDUSTRIES stated that the front wheel brakes on the Excelsior car, made in Belgium, were of Perrot design. These brakes are special to the Excelsior factory.

Get Yours—It's Guff, but It's Free

Recently there has been printed in **AUTOMOTIVE INDUSTRIES** a series of articles on the poor publicity put out on behalf of automobiles and printed in "automobile sections" of the daily newspapers. These were written by "automobile editors," who placed the blame on manufacturers. Here is the other side of the question, written by the automobile advertising men. This comment was printed in the Editor and Publisher.

By F. A. D. Seelye*

THE high cost of print paper has made it incumbent upon hundreds of newspaper publishers throughout the country to scrutinize closely the way their automobile pages are being edited. In many cases, in fact, space has been cut down to such an extent that it can no longer be called legitimately an automobile page. This condition was not brought about through the publishers' own volition, but because it was made mandatory by the acute shortage of paper.

So this condition brings us face to face with the situation as to whether or not the automobile page should be continued as it has been edited and conducted in the past. There is no getting away from the fact that the more lenient a newspaper is with its white space, so far as it pertains to automobile publicity, influences a selection of a medium to carry a distributor's copy. Especially is it true at this time when most of the automobile manufacturers have adopted the policy of sharing advertising expense equally with the local distributors. In this way the personal equation or a little write-up might secure the account for a paper that was not really entitled to it because a contemporary paper made its impress felt upon the advertising department.

This condition exists especially in all the fairly large sized cities throughout the country. The factory no longer enjoys its former exclusive prerogative of deciding what papers the distributors should use. The factory's advertising activities being controlled by a man who is in the custom of selecting papers according to the quantity and quality of the circulation is not influenced one iota as to whether a paper is susceptible to publicity items.

The space devoted by most newspapers to automobile publicity has been a tremendous factor in their phenomenal success. It has served to set them apart in the public mind from other equally as important commodities, such as the reaper and cotton gin, for instance.

There is no doubt but what constructive automobile publicity carries a real news value for people who are either in the market for a car now or are contemplating the purchase of a machine at some future time. Nevertheless, there is no disputing the fact that there has been a lot of drivel among the material submitted by the factories, while, on the other hand, there has been much that has been constructive and worth while.

In the past most of the stories have been written around the head of the firm and what he thought, and said, and did. One of the reasons that the present automobile pub-

licity is objectionable is because 75 per cent of the copy is about such matters and other sundry items concerning trade tendencies, good roads in Madagascar, etc.

The average newspaper reader is not interested in such stories, but stories about new features of any car, such as 15,000 miles on a set of tires or 30 miles on a gallon of gasoline, is something that every automobile owner or prospective purchaser of a car will read with interest and delight.

Practically every well-known automobile advertising manager in the country is unanimous in the opinion that the present method of conducting an automobile section is unsound.

H. R. Hyman, advertising manager of the Cole Motor Car Co., is very emphatic in his remarks about the character of automobile publicity that is now appearing in most of the automobile sections of the daily press. He says:

"Personally, I feel that as long as newspapers are giving automobile publicity, it is up to each and every one of us to get just as much of it as we possibly can, but, frankly, I believe that its actual worth is greatly overestimated.

"I have come to this conclusion simply from the fact that in quite a long experience in the automobile industry, I have yet to find a publicity story which created any considerable amount of comment, while one hears arguments and discussions continually emanating from what persons have read in automobile ads.

"Frankly, I believe that we will all be a whole lot better off when newspapers no longer take the ordinary gush that is sent out by motor car companies, but will have each company render them sort of a news service in which brief statement of facts concerning the company will be set forth and on which the motor car editor may ask for elaboration from the advertising manager should the subject mentioned attract him as having certain news value."

The Goodyear Tire & Rubber Co. has a well-equipped publicity department. Many newspaper men concede that Goodyear sends out the best constructive publicity of any rubber company. Therefore, the remarks of E. E. Helm of the publicity department are interesting:

"The automobile page, in my opinion, has to a large extent lost what advantages it originally possessed by reason of the abuses that have been allowed to creep in—notably the meaningless 'boost' write-ups. This, of course, is not so in all cases, but there is an inclination on the part of the public, I am afraid, to look upon the average automotive section as a sort of depository for the effusions of the energetic press agent."

*Advertising manager of the Packard Motor Company of Pittsburgh.

"This is unfortunate, of course, but it is a condition brought about largely through the advertising solicitor's anxiety to sell his space and agreeing to use free publicity without regard to its merit. Constructive publicity, so called, if adhered to, might save the situation, as there is no doubt plenty of demand for intelligent, technical, or helpful information for the automobile user as well as publicity taking the form of straight news stories with a minimum of propaganda.

"We try to make our publicity of that sort, but in placing our advertising do not pay any attention to whether or not our publicity is used. We do, however, in placing our advertising contracts provide that our copy be used on pages other than in the automobile section."

The Place of Advertising

Of recent years several automobile firms have been sending out contracts with the stipulation that their advertising is not to appear in the automobile section. Franklin, Packard, Pierce-Arrow and other manufacturers prefer to remain out of the fold. All the large rubber companies do likewise, namely, Goodyear, Firestone, United States, and Goodrich.

H. H. Goodheart, advertising manager of the Franklin Automobile Co., implies the reason for some advertisers wishing to remain out of the automobile section. He says:

"I have always felt that an automobile page could be made interesting. The same thing that makes a sporting page interesting could just as well apply in the case of motor cars, which have almost as big a following as baseball, boxing, football, etc. Probably nothing in the line of recreation is more in the minds of people than the automobile.

"I have felt all the time that 'puffery' in an automobile page is a mistake. Also, that the subsidizing of the automobile page through automobile advertising is one of the reasons for all the ills that automobile publicity is contending with. Automobile news ought to stand on its own legs.

"As the majority of pages are now edited, they do not appeal to us. In fact, we would much prefer that Franklin advertising be separated from the automobile section. Somehow, we don't like the atmosphere of the majority of the sections. There is so much stuff that is purely of the press agent variety in them that it prejudices well-intended advertising. We want what we say about the Franklin car to be believed, and we don't want any more resistance to this aim than we absolutely are compelled to have. I think, considered in the mass, the automobile page has done a great deal for the automobile industry. It is hard for me to see the advantage of hundreds of such pages when considered separately."

The condition that Mr. Goodheart mentions is due, no doubt, to the fact that most newspapers have never drawn a line straight and plain between legitimate publicity and mere advertising in the guise of news.

No Disguise for Advertising

Advertising is all right, but should wear no disguise, and it should be purchased and paid for at regular space rates, with no bonus in the shape of write-ups in the news columns. The test of legitimate publicity matter must be absolutely its news value, and if an automobile company has no matter to give out that will stand that test, independent of any advertising, it has no occasion for a publicity department.

Mr. Walsh, publicity manager of the King Motor Car Co., observes:

"My ideas on automobile publicity are conflicting, sometimes I convince myself that the usual run of publicity

isn't worth a 'tinker's hoorah'; then on occasions I hear a few people comment on it, and I change my coat and convince myself that there may be some merit in the stuff because some papers continue to run publicity; we try to get our share of it.

"I believe the majority of men connected with the industry of supplying automobile publicity will endeavor to improve and get real news in the stuff they send out, and further I think that the future of the automobile page will be a matter of evolution, as worked out by the paper's advertising department and the publicity men furnishing material."

L. B. Dudley of the Federal Motor Truck Company predicted at the Advertising Managers' meeting at the National Automobile Chamber of Commerce in New York around the first of the year that it was only a question of time when the newspapers would discontinue using automobile publicity where the name of the product was mentioned.

It is hard to conceive, however, of such a bold step being taken by a few newspapers. In cooperation there is strength, and unless the papers work in unison the paper that instituted such a movement would soon find that its automobile lineage was dropping faster than the Hindenburg line broke before the onrush of the allied troops.

Mr. Dudley, who entertains some vigorous ideas on the way a newspaper should edit its automobile section, says, among other things:

"The proper use of publicity in question is it tells the news story of automobiles and motor trucks, which is the only thing that will prevent eventually the entire publicity matter being cut out of all newspapers, and I think it is up to each and every advertising manager to get the broad viewpoint and tell those stories which will build up the industry and which are of news to the greatest number of readers of the publication, and leave out all of this small-town stuff and small-man opinions and space fillers."

Cut Publicity to News Value

"As far as the Federal is concerned, we would be perfectly happy if all publicity was cut down to the real meat of the news value of the story and the name left out of all of them. If this was done we would take our chances on getting our share of the results, but until that time comes, of course, we are going to use publicity."

R. C. Sackett, in charge of automobile advertising for the Studebaker Corp. of America, holds opinions directly contrary to the above.

It is well to remark, however, that Mr. Sackett is practically alone in his optimistic forecast of the trend of the average automobile page. He says:

"I believe that the growth of the automobile page idea is assured. Any restrictions that are now being placed upon the automobile page or automobile section, I believe are only temporary and are contingent upon the supply of white paper. The shortage of white paper surely will be relieved at some time, as it is inconceivable that it will go on this way forever."

"Furthermore, during the past two years there has not been as much automobile advertising in the newspapers as there would have been had there been a normal growth and had we not been interrupted by the war. The war cut down the amount of newspaper automobile advertising in 1918, and the unusual shortage of cars, which has not yet been overcome, cut down the advertising in 1919, and the amount of newspaper advertising ought to begin to grow during 1920, and as it does increase there is every reason to believe that publishers will devote more space and more time and attention to constructive automobile pages."

"As far as publicity goes, I do not believe that publicity which has no news value is worth anything. The majority of canned publicity articles that are sent out by the manufacturers are pure bunk."

A constructive thought contributed by Mr. Sackett is that more local copy should be used. Make the publicity personal. Eliminate John Jones said this and that, and publish something that the average automobile owner will be interested in reading.

J. E. Baird, advertising manager of the General Motors Truck Co., declares:

"I would welcome the day when the newspapers would cut out the slush they now use in their automobile sections of the Sunday papers.

"I believe that the newspapers ought, and should be, willing to use constructive publicity; that is, articles that are of a news value as news, or that are instructive and helpful to users of automobiles and trucks."

Another automobile company that spends a quarter of a million yearly in newspaper advertising, but whose advertising manager prefers to remain anonymous, says:

"I do not believe that automobile publicity, as handled at the present time, in ninety-nine newspapers out of a hundred, has the slightest influence one way or the other on the pleasure or satisfaction of the readers of those newspapers.

"If I am right and automobile publicity as at present conducted is a matter of indifference to newspaper readers, then I think the conclusion can safely be drawn that most automobile publicity is a waste of white paper as far as the newspapers are concerned, and a waste of effort as far as the automobile manufacturers and dealers are concerned.

Automobile Page Unbiased

"I believe that the automobile page in the future will and should be a page of unbiased, thoughtful and exact review and criticism, conducted without fear or favor by a man who has been carefully trained for his job, and who is, as far as possible, outside the control of his newspaper's business and advertising departments."

H. C. Dart, advertising manager of Paige-Detroit Motor Car Co., said:

"I would welcome concerted action on the part of the newspapers to compel a rigid censorship of publicity, and I certainly wish the instigators of this movement the best of luck.

"It is my observation that the best newspapers in the country either refuse to publish any publicity at all, or print only the kind of stuff which is real news. I refer to such publications as the *Kansas City Star* and the *Chicago Daily News*, but there are many others.

"This company does not discriminate against any newspaper that either excludes publicity entirely or restricts it very closely so long as the same restrictions pertain to all advertisers. Personally, I have a higher opinion of such papers."

Fred Wellman, advertising manager of the National Motor Car & Vehicle Corp., sums up in a concise way the best manner in which an impartial automobile page should be conducted. He says:

"Our idea of a good automobile page would be one that features mostly the new and interesting developments in current models, together with seasonal information as to local tours, answers to questions from owners regarding care and upkeep of cars and similar information of direct interest to the motorist. We believe that a page edited in the above fashion would be read with keen interest by a majority of automobile owners, and that advertising on such a page would undoubtedly have extra value.

"The reform of automobile pages of the present day,

we believe, will have to come about through the efforts of the editor rather than the advertiser. The advertiser will usually submit anything he can get away with, relying on his purchases of display space to put his copy over. As long as the newspapers accept material on such a basis, obviously there is going to be little improvement.

"If the newspapers, however, will edit their automobile pages as the editors of automobile trade papers do, for instance, giving space only to real automobile news and rejecting everything else, the reform that every manufacturer would welcome will be accomplished."

A Constructive Force

Much along the same lines is the opinion of Ralph Kaye, advertising and publicity manager of the Kissel Motor Car Co., who says that he believes that the right kind of newspaper publicity is of great constructive force. To make it worthy of note this publicity must contain real news of interest to present and prospective owners—it must not be a free advertising puff.

Practically every manufacturer of a medium-priced or better-priced car in their price field is interested in reading the automobile pages if it is conducted along the proper lines.

As A. J. Rogers, advertising manager of the Nordyke & Marmon Co., says:

"We do believe that automobile owners and persons interested in the purchase of cars like to read the automobile news, but they want something that either has some real news value or real feature value rather than a lot of the bunk that is being passed out."

It was significant that a meeting of the Automobile Advertising Managers was called at the time of the New York Show in an effort to thresh out this matter of free publicity. A good many of these discussions were productive of constructive ideas. In fact, the whole meeting was dominated by the talk on newspaper publicity. Some extreme views were expressed and one advertising manager went so far as to offer a resolution condemning publicity without reservation. It is well to note in passing that he was supported by two others.

As Harry S. Daniels, advertising manager of the Dort Motor Car Co., said following the meeting:

"No one would suggest amputation of the head to cure a cold, and publicity can certainly be made valuable to the industry if properly planned and executed. The real remedy lies with the newspapers themselves. Instead of running their automobile pages with one man, who is usually also the advertising solicitor, they should assign to automobiles able writers and editors who will make of the page a news feature which its importance justifies. By following up local owners of automobiles, a world of live interest matter can be obtained—matter which will interest the reading public generally. The opportunity for pictures of a newsy character is just as great."

Condemns Bunk

It does not take any stretch of the imagination to see that fully 95 per cent of all the automobile advertising managers in the country have gone on record as condemning the kind of publicity that is being used by the newspapers. In fact, most of them go on record as calling it worthless, and some even refer to it as "bunk."

Inasmuch as the factories themselves are not in favor of their own publicity, it would seem as though the doctoring should be taken care of by the different newspapers. In fact, it would seem that if all the newspapers would get together and adopt rules and regulations in an effort to standardize the kind of publicity they would accept and publish, it would go a great ways toward obviating the present discontent that seems to hold sway in this field.

What the Industrial Report Means to the American Manufacturer

Believing that few business men will have the time to read carefully the lengthy report of the Second Industrial Conference, Mr. Tipper gives here its best points and interprets it for the benefit of the employer. He explains briefly the proposed machinery for settling disputes, and stresses several other forward-looking parts of the report.

By Harry Tipper

THE Second Industrial Conference called by the President has just returned its report. It is to be remembered that the first conference split over the question of collective bargaining and the recognition of the union program. From the beginning it was evident that the first conference could not arrive at any proper conclusion because of its composition. The second conference was made up of individuals chosen because of their standing in public life, their knowledge of economics or their contact with industrial affairs. These individuals were not bound by the mandates of any associations and were in a position, therefore, to occupy themselves with impartial proposals looking to the solution of some of the questions at issue.

It is not likely that the report will have any material bearing upon governmental action. Most of the report is concerned with conclusions arrived at by the conference after its investigation into their particular subjects. The conclusions are offered for the information of industry and the public and no suggestions are made for machinery to take care of the suggested difficulties. There is one important exception to this and it is, in fact, the most important part of the document. Machinery is suggested of a national and regional character, worked out with considerable care, for the settlement of industrial disputes through voluntary action by the parties concerned. It is this part of the report which may receive the attention of Government and Congress and which concerns the manufacturer more than any other particular point, although much could be learned from a study of the other conclusions.

The foundation principle which has guided the conference in its examination of methods for the settlement of industrial disputes is to be found in the two paragraphs quoted here:

The guiding thought of the conference has been that the right relationship between employer and employee can be best promoted by the deliberate organization of that relationship. That organization should begin within the plant itself. Its object should be to organize unity of interest and thus to diminish the area of conflict and supply, by organized co-operation between employers and employees, the advantages of that human relationship that existed between them when industries were smaller. Such organization should provide for the joint ac-

tion of managers and employees in dealing with their common interests. It should emphasize the responsibility of managers to know men at least as intimately as they know materials, and the right and duty of employees to have a knowledge of the industry, its processes and policies. Employees need to understand their relation to the joint endeavor so that they may once more have a creative interest in their work. Industrial problems vary not only with each industry, but in each establishment. Therefore, the strategic place to begin battle with misunderstanding is within the industrial plant itself. Primarily, the settlement must come from the bottom, not from the top.

It is encouraging to find that a conference of this character has recognized the necessity of unifying the organization within each industrial establishment. The position which has been taken by the writer in these articles has been indicated a number of times and the continued emphasis which has been placed in these articles on the necessity for starting the settlement of industrial relations in the individual establishment is again emphasized by the paragraphs just quoted.

It is evident that the conference feels strongly upon this subject. It regards the joint organization of the individual establishment through employee representative plans as a preventive measure and, therefore, of more importance than any measure which may be taken for the settlement of disputes once they have arisen. The fact that the employee representative plans have aroused opposition from both the more reactionary employers and the more important trade union leaders, is much in its favor and an indication of its value.

It is interesting to note that Mr. Gompers, in his comment upon the report, disagrees entirely with this part and, in addition, expresses considerable contempt for the new machinery proposed.

The machinery proposed for the adjustment of disputes which have already arisen, takes in a National Industrial Board, with Regional Adjustment Conferences which shall be empowered to deal with industrial disputes when such differences are submitted to them voluntarily by both parties. The submission of the dispute to the Regional Conference, however, constitutes a voluntary agreement between the parties that there shall be no cessation of production during the process of adjustment and that unanimous agreement of the Regional

Conference, or the other machinery provided for the purpose, shall constitute an effective collective bargain, which the parties agree to accept.

It is not necessary to go through all the detail of procedure but it is important to examine the composition of the board and the provisions for the publicity of the findings. The National Industrial Board, proposed under this plan, is to be composed of nine members: Three representing employers, three representing employees and three representing general interests. It is stated that they shall be selected without regard to political affiliations and that the chairman shall be chosen by the President from one of three persons who represent the general public. The term of office is to be six years. The function of the National Adjustment Board is to act as a Board of Appeal in disputes not settled by the Regional Conference and to lay out the general administrative plans.

The Regional Conference calls for a chairman representative of the public interest appointed for three years and vice-chairmen as required for specific cases. It also provides for panels of employers and employees from whom will be drawn the members to sit upon the Regional Board for any particular case. The position upon the panels is to be determined by lot, with the selection from the panels to be in rotation. The conference, as actually constituted, will consist of four representatives of the parties to the dispute, four persons selected from the panels and the chairman. Disputes must be voluntarily submitted to this conference and they cannot be acted upon by the chairman until he is convinced that proper attempts have been made to settle the matter through the ordinary machinery.

There is a provision for the constitution of a Board of Inquiry from the Regional Conference, where the parties refuse to submit the matter. This Board of Inquiry has power to ascertain the facts and give them to the public. There is a provision for the application of the machinery of this type to public employees, suitably modified to agree with governmental employment.

The rest of the committee report is concerned with industrial relations as a whole, hours of labor, women in industry, child-labor, housing, wages, profit and gain sharing, cost of living, agriculture and unemployment. A part of the report is devoted to the necessity for a public employment clearing house.

The report is characterized all through with a degree of impartiality not found in previous reports of this kind. The statements under hours of labor indicate this constructive approach to the problem. Here again the Industrial Conference has recognized the fact that proper hours vary with the character of the employment and that, until further scientific knowledge of the effect of various kinds of work will indicate the basis upon which this question should be considered from a public standpoint, only a relative improvement can be made. The conference goes on record definitely for one day's rest in seven, for not less than forty-eight hours, as a general matter, and recognizes the present tendency of practice for a schedule of not more than forty-eight hours.

The discussion of child-labor is timely, inasmuch as the United States has not been able to deal with that matter and the regulations of the States vary to a considerable degree. In its public efforts to safeguard the health, to consider the education and to increase the standard of its working children, the United States is far behind European countries. In some States, the conditions are notoriously bad and it is to the employers'

interest as well as to the public interest to have the matter of child labor thoroughly studied and put upon some sound basis.

The position of the conference on the wage question is summed up in the two paragraphs quoted herewith:

If it is for the nation to insure that wages shall not sink below a living level and for employees not to restrict production; it is incumbent upon employers to see that special effort and special ability on the part of their employees receive a stimulating compensation. If increased output and efficiency are met only by a reduction of piece prices, the incentive to such effort is taken away. Employees to do their best work must feel that they are getting a reasonable share of any increased return that they bring the industry. Labor incentive is a factor that is as shortsighted to ignore as incentive to capital.

From this standpoint, the question of methods of wage payment is one that deserves careful study on both sides. Industries which have established facilities for mutual discussion of such questions, whether through union or other forms of employee representation, are finding that it is possible at the same time to safeguard the worker from exploitation and to safeguard incentive to production.

The other part of the report deserving study and particular mention is that dealing with public employees. This conference has paid due attention to the failure of municipal, state and national governments to provide reasonable means for the payment of government employees in some relation to the increasing cost of living. It specifically takes up the question of teachers and points out that since the principle of governmental employment removes the possibility of any resort to the strike, this only emphasizes the importance of providing means whereby these public employees will be treated justly.

The position of the conference on this matter is one which has been neglected far too long and manufacturers in all industries should be much interested in government machinery for the constant adjustment of wages of public employees. There is no hope of our securing reasonably efficient postal service, patent office service, the right kind of co-operation from the Department of Agriculture, the Bureau of Standards, the Department of Commerce and other bodies relating largely to industrial matters, unless the payment of government employees is upon a just basis and recognizes economic conditions with a reasonable certainty. It is particularly hazardous to leave such a disparity in the payment of policemen, firemen and others organized for the purpose of protecting the ordinary citizen.

Industry would do well to interest itself thoroughly in the question of payment of government employees, and particularly those departments having a direct bearing upon the safety, the health, the protection and the development of industrial efficiency.

Altogether the report is encouraging, it does not suit Mr. Gompers, but it has had the effect of showing how completely Mr. Gompers desires the dominating influence of trade unionism in the government of industrial matters. It will not suit the reactionary employers of the old school but it will appeal to the average man, both employer and employee as a sane constructive document, which will, if it is properly studied, illuminate many of the industrial questions at issue and provide some basis for the common understanding of their significance.

AUTOMOTIVE INDUSTRIES

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An Automotive Safety Plan

IT is a part of the year's program of the National Safety Council to reduce the number of deaths from automobile accidents. That was announced in a recent issue of the *National Safety News*. This idea, briefly, is to draft an educative plan in driving and traffic control. It is to be submitted to a committee of eminent and practical manufacturers and safety engineers representing many industries. Then it is to be revealed to the public through schools and public gatherings.

The big fact on which the plan is based is that 9000 persons were killed in this country last year by automotive vehicles. The figures are given as a fact and they do not appear to be unreasonable when the results in some cities are set forth. It is said that automotive vehicle accidents equal all other industrial accidents. There has appeared in certain circles some resentment of this activity and of the publicity given to these figures.

But why? The automotive industry is vitally interested in these things. These very fatalities are an ailment which must be cured, if the automotive

vehicles are to enjoy the reputation they should have. Of course, it is unpleasant, as is the case of the man who goes to a doctor and is told that his heart action is weak and that he must undergo certain treatment if he is to live. If he is a sensible man, he takes the prescribed treatment or submits to an operation, and thereafter enjoys better health.

So now, if the safety operation seems advisable, let's help it along. The results soon will be apparent if the treatment is correct, but the automotive industry should step in and help to formulate the treatment. Once the operation is over, these things will result:

Much of the dogmatic opposition to automotive vehicles in legislative circles will disappear.

Sales resistance among timid persons, who fear taking the life of another more than the danger to themselves, will lessen.

Traffic conditions in the larger centers will be eased and persons who now scorn to own a car can be induced to buy.

The reckless driver who is creating a sentiment against automotive vehicles will be curbed.

The automotive industry has grown rapidly and well, but to too great an extent its eyes have been centered on the problems of the moment. Design has been refined and great progress made mechanically. But in older lines of trade certain educative work has been undertaken with great success by the industry, and it is time that our automotive manufacturers look toward refinement in the use of their vehicles.

The Farm Truck

IT is becoming evident that a large proportion of the demand for motor trucks in the next few years will come from farmers. Each year an increasing number of farmers are investing in tractors and, as a result, are enabled to dispose of some of their horses; however, they will be able to realize the full advantage of their tractors only when they are in position to accomplish by motor power all of the various kinds of work for which horses generally are used on the farm. A large part of this work consists in hauling, hence the motor truck meets an important requirement of the farmer.

Until a few years ago motor trucks were sold almost exclusively in the large cities and truck design was strongly affected by this condition. As a result of the opening up of the farm market, we will probably see an entirely new type of truck design developed, taking account of the peculiar conditions of use. The farm truck must be able to travel over fields as well as on roads, for it will be used in gathering the products of the farm as well as for carrying them to market and taking back merchandise that the farmer buys.

One of the problems connected with farm truck design is due to the widely different character of the loads it must carry. The farm truck will be used for hauling hay as well as for hauling brick and stone; it must serve for transporting live stock and

it must carry grain in bags. This problem of dealing effectively with widely different kinds of loads is probably best solved by the provision of interchangeable and convertible bodies, and the solution has been foreshadowed in present farm wagon practice with its side boards, tail gates, hay racks, etc.

It is generally believed that the proper size of truck for the great majority of farms is one of 1½ or 2 tons load capacity. A large truck would have to be operated at less than half load too large a proportion of the time, and would be uneconomical in operation, aside from the larger capital requirement. A smaller truck than 1½ tons could not handle all of the loads that must be taken care of. Very likely the farm truck will be pneumatic-tired because large pneumatic tires will enable it to travel over soft ground where wheels with solid tires would sink to a great depth and the higher speed of the pneumatic truck will be an appreciable advantage in carrying produce to distant markets. The somewhat higher first cost of pneumatic equipment is a drawback, which, however, is not serious if there is plenty of work so that the truck investment is not idle a large part of the time.

The problem of keeping the truck working can be solved by adapting it for as many purposes as possible. The provision of a power take-off would permit use of the truck for belt work, and a power hoist would add greatly to its utility for certain classes of work.

Every farm tractor that is being sold creates a demand for at least one farm truck, and, since it is calculated that about 300,000 tractors will be sold this year, it will be seen that the possible farm truck market is a large one. Even where there is no tractor on the farm, the truck has its advantages in relieving the demands made on the horses, and these are particularly pronounced if the district has plenty of hard surfaced roads.

Spirit and Production

WHAT has that intangible thing called "the spirit of the plant" to do with effective production? That there is such a thing and that it is present, just as definitely as if it could be seen and measured, is not to be doubted. It is almost always true, moreover, that the spirit of the management, as embodied in the ideas and opinions of the chief executives, "carries on to some degree" through the foremen and minor executives and permeates the work of the entire plant.

The general spirit of the automotive industry, particularly as related to the feelings of the management toward their workmen, can probably be classified in a general way in two divisions. First, those executives who feel that their experience indicates that their men are ready to take advantage of them at every turn, that the worker's chief object in life is to get as much money for as little work as possible, that industrial relations are similar to a perpetual battle and that the only solution, so far as

they are concerned, is to "get labor where they want it." The second group, which comprises some of the best known and most successful firms in the automotive industry—as also does the first group—is comprised of those firms whose executives find that the square deal policy works out to the profit and benefit of both themselves and their men.

One chief executive of a comparatively small plant said recently, "The only way you can handle the labor problem is with the big stick; these men do not appreciate anything you do for them. Anyone who tries to tell you they can be dealt with otherwise is impractical; he has had nothing to do with the actual operation of an industrial concern."

While this firm has not had any actual strikes, some of its departments are constantly visited by that industrial specter, the Enormous Turnover, and there is a constant attempt on the part of both management and men to get the better of one another in every way possible. It is not merely the theorist who will say that such a condition is utterly subversive to maximum production.

This fact is witnessed by what the vice-president and production manager of a prominent large concern said: "We have never had any labor trouble, and we usually have the lowest turnover of any automobile manufacturer in our city. It is hard to state a definite reason for this. We simply treat all our men as we would like to be treated ourselves. We try to instill that spirit into every man in our organization from the top to the bottom." And the employment manager of the same concern firmly believes that this intangible "spirit," practically manifested in many ways, is a definite aid to production and to turnover reduction.

These two examples are illustrative of two different, yet typical, attitudes toward labor current in the automotive industry. As a general thing, the firms whose policy follows the lines of the second example are getting better and more constant production and are much less troubled with absenteeism, lateness and general inefficiency. It is these things which concern the practical production man. It is important to note, however, that this "spirit" of co-operation has not been, and cannot be, built up overnight. It is a long process, which must start with a belief in the efficacy of the square deal. The spirit of the plant can never be changed overnight by the installation of some "welfare plan" or even by a change of heart on the part of the management.

A RECENT trade announcement is to the effect that the fourth American Chamber of Commerce in China has been established at Harbin. Recent months have seen the promulgation of many such bodies throughout the world, and these, in connection with the activities of official and other semi-official agencies, evidence the growing place of America in world trade. And, by the way, it might be added that such organizations as that at Harbin stand ready to aid automotive exporters in carrying on their overseas business.

Complete Plans for British Built Ford

Whitehead Aircraft Firm to Co-operate with Dealers in Partly Assembled Car

LONDON, March 11 (Special correspondence) — Following recent reports that an effort would be made by the Whitehead Aircraft interests to co-operate with dealers in producing a popular priced car, it is learned that the plan has now taken definite shape.

It is understood that a body of Ford dealers and others have arranged to import some hundreds of parts pending their ability to produce wholly for themselves and to assemble a Ford chassis on a co-operative trading basis.

Report has it that at the time of the armistice there was a stock of Ford imitation and other parts in Great Britain which have been absorbed by the dealers, and also that some of the contributors for these parts are desirous of continuing their output. The experiment is interesting, but the issue is generally considered doubtful of success for lack of capital needed to finance so big a scheme. As a trade venture it will be difficult to attract outside capital to it, unless by way of loan, and such a course is unlikely if the finders of the capital are to be excluded from supervising its use.

It may be added that the Ford company has issued a warning against certain imports of their cars by unauthorized persons. A number of cars from this source have been sold. This does not appear to be in any way connected with the new co-operative production venture of the group of dealers referred to, however. Rumor has it that for the present the parts for the dealers' "Ford" are being imported from American firms which, having built them to Ford orders, have had them left on their hands.

DENY FORD PARTS ORDER

NEW YORK, March 24—Flat denial was made to-day by the Gray-Andrews Corporation, agents in this city for the Cincinnati Screw Company, of reports that an order had been given the screw company by Amalgamated Motors, Ltd., of London, formed by the Whitehead interests, for immense quantities of Ford parts to be assembled in England. Andrews said an inquiry had been received early in the year for \$100,000 worth of parts, but that after an investigation of the situation it had not been accepted.

COAST RATES PROTESTED

NEW YORK, March 24—The National Automobile Chamber of Commerce has protested to the Interstate Commerce Commission against proposed heavy freight rate increases on automobiles and trucks shipped to the Pacific Coast. The commission has informed the N. A. C. C. that no decision has been reached.

"It seems unlikely that the commission would act on the recommendation of the committee of railroad traffic officials in such an important rate adjustment with-

out nearing all parties interested," says a statement of the N. A. C. C. "We believe the case will be opened for this purpose. Both class and commodity rates from points east of Chicago would be advanced, causing heavily increased freight charges on all articles."

Central to Embargo

All Small Shipments

NEW YORK, March 24—The New York Central Railroad will declare an embargo on all shipments of less than 10,000 lbs. to all points on its system. The purpose is to release cars for larger shipments. No estimate has been made of the duration of the embargo.

The New York Central's embargo on shipments in carload lots from Canada to points east of Buffalo remains in effect and there is no immediate prospect of raising it. It has added materially to the embarrassment of Canadian shippers who have been troubled for some time by an acute car shortage.

Can't Get Belgian Glass

WASHINGTON, March 24—The Department of Commerce has been advised by Trade Commissioner Herring at Brussels that it is virtually useless to attempt at this time to obtain supplies of Belgian plate glass. Efforts are being made by manufacturers to supply pre-war customers, but no surplus is available for new ones and orders for future delivery are not being accepted. Production is only about 60 per cent normal.

Navy Designs Plane for Speedy Take-off

NEW YORK, March 24—A new plane, which will hop into the air after a very short take-off, has been designed by the Navy for use at sea. It is called the sea-airplane and is designed for operation on board ship where the flight must be started from restricted space.

C. J. Zimmerman, chief test pilot of the Aeromarine Plane & Motor Co., has tested the new machine on and over Raritan Bay. Zimmerman got the machine into the air after a short take-off, which consumed only five seconds. The 300-hp. Hispano motor is expected to develop a speed of 110 miles an hour and to be able to lift the plane 5000 ft. in 10 minutes. Weight, with full load, is 2730 lb.

It is designed to carry a pilot and machine gunner or observer, and the planes are mounted with more than the usual amount of "stagger," so that both pilot and observer can have unrestricted view downward as well as overhead.

BUICK PRICES GO UP

FLINT, MICH., March 22—The following revised prices on Buick automobiles are effective April 1, f.o.b. factory: K-44, \$1,595; K-45, \$1,595; K-46, \$2,235; K-47, \$2,465; K-49, \$2,865; K-50, \$2,895.

Makers Seek End to Freight Car Tangle

Want Cars Turned Over to Industry Without Respect to Ownership

DETROIT, March 23—J. H. Marvin, general traffic manager of the National Automobile Chamber of Commerce, headed a party of Detroit automobile men who left last night for Chicago, Cincinnati, Pittsburgh and other railway centers, seeking relief from the freight car situation.

The party included W. H. McLeod, Buick traffic manager; Preston G. Findlay, Dodge Brothers; J. H. Main, Cadillac; E. H. Hodges, Hupp; C. J. Scharff, Chevrolet, and W. J. Dibble, Hudson.

Freight shipments practically have been suspended since the return of the roads to private ownership. Under private control cars must be returned and used by the roads owning them and the present serious situation is the result largely of the indiscriminate use of cars under government control.

The Michigan Central furnishes a striking example in that only 5 per cent of its 14,000 cars are now in its possession. Others are scattered in various sections of the country. These are chiefly wide door cars suitable for automobile shipment.

The delegation will seek to impress upon officials that all new cars be built with wide doors to accommodate automobiles. At present practically the entire output of factories in this vicinity are being driven to their destinations at enormous cost. To relieve conditions the delegation will ask that indiscriminate use of freight cars be permitted until the rolling stock can be unscrambled from its present tangle.

HEADS PACKARD EXPORT

NEW YORK, March 24—Active management of the Packard Motors Export Corporation has been delegated to Col. Fred Gardway, who has been appointed vice-president and general manager, with headquarters at 1861 Broadway. The corporation will control the Packard business throughout the world, with the exception of the United States and Canada.

TO BAN FOREIGN PLANES

WASHINGTON, March 24—Evidence of plans formulated by foreign aircraft dealers to unload thousands of machines in the United States and to advertise them extensively here has been presented to the Finance Committee of the Senate. The result is that tariff restrictions are favored by the committee to protect American manufacturers.

Senator New of Indiana, strongly advocated the anti-dumping tariff.

TEMPLAR SUES STANDARD

CLEVELAND, March 22—The Templar Motors Co. has filed suit against the Standard Parts Co. for \$1,400,000, for alleged breach of contract in failing to deliver 11,000 axles.

Automobile Exports from the United States by Countries During January, 1920

COUNTRIES	TRUCKS				PASSENGER CARS				PARTS Dollars
	COMPLETE NUMBER	CARS Dollars	CHASSIS NUMBER	DOLLARS	COMPLETE NUMBER	CARS Dollars	CHASSIS NUMBER	DOLLARS	
Austria	19	38,250	...	...	368	368,329	...	...	80
Belgium	19	39,911	2	2,838	87	82,515	...	...	258,508
Denmark	...	...	...	...	1	5,000	...	...	2,839
Finland	20	37,412	2	7,348	90	93,115	...	...	209,024
France	...	...	...	...	7	8,915	...	...	208
Gibraltar	...	...	1	1,900	37	68,918	1	525	6,389
Greece	1	2,154	...	...	7	23,574	...	...	6,169
Italy	...	...	...	...	6	6,535	...	...	...
Malta, Gozo, and Cyprus Island	15	8,838	...	...	111	142,189	...	...	2,963
Netherlands	35	75,694	...	...	82	125,010	...	...	21,040
Norway	...	...	...	...	25	21,520	...	...	400
Poland and Danzig	...	...	...	...	176	199,003	7	7,723	15,812
Portugal	17	21,107	1	3,440	1	3,500	...	...	17,605
Roumania	4	2,500	40	17,675	10	4,830	...	...	2,030
Russia in Europe	20	42,231	...	...	117	159,466	...	...	11,950
Spain	73	110,947	5	3,855	374	541,029	...	...	18,820
Sweden	25	17,153	...	...	67	93,337	...	...	7,900
Switzerland	47	74,790	...	...	33	32,555	...	...	15,758
Turkey in Europe	419	656,180	153	228,284	1,296	1,470,897	69	63,256	749,012
England	2	1,741	...	...	29	28,311	...	...	4,062
Scotland	...	...	...	...	83	89,763	...	...	100
Ireland	...	...	...	...	...	...	...	...	21
Jugoslavia, Albania, and Fiume	...	...	...	...	1	560	...	...	...
British Honduras	91	164,176	39	73,227	559	674,425	19	37,795	2,002,250
Canada	...	...	...	...	3	1,612	...	...	1,062
Costa Rica	1	1,890	1	1,000	22	28,978	...	...	1,843
Guatemala	1	900	...	...	1	600	...	...	3,272
Honduras	4	2,279	...	...	46	44,137	...	...	2,723
Nicaragua	2	1,006	...	...	13	12,692	...	...	3,848
Panama	...	...	...	...	19	24,610	...	...	7,067
Salvador	...	...	...	...	219	201,841	10	3,919	80,316
Mexico	65	79,527	...	...	2	2,281	...	...	1,731
Newfoundland and Labrador	...	...	...	...	...	...	...	...	1,541
Barbados	12	6,045	...	...	27	18,455	...	...	9,775
Jamaica	...	...	...	...	3	2,166	...	...	8,073
Trinidad and Tobago	4	4,011	...	...	9	4,118	...	...	1,389
Other British West Indies	79	177,027	4	10,983	266	307,769	...	...	108,513
Cuba	...	...	...	...	4	1,550	...	...	280
Danish West Indies	...	...	...	...	3	2,033	...	...	277
Dutch West Indies	4	2,715	...	...	4	5,000	...	...	3,690
French West Indies	3	4,654	...	...	5	7,749	...	...	5,829
Haiti	5	8,096	...	...	8	10,771	...	...	5,298
Dominican Republic	25	21,672	...	...	228	306,602	...	...	341,062
Argentina	1	5,600	...	...	1	4,100	...	...	1,286
Bolivia	28	28,520	1	2,100	400	382,726	...	...	87,376
Brazil	2	2,379	...	...	49	82,461	...	...	18,734
Chile	5	4,458	2	2,120	24	42,566	...	...	7,844
Colombia	1	3,635	...	...	9	12,180	...	...	4,079
Ecuador	...	...	...	...	9	10,523	...	...	1,013
British Guiana	...	...	...	...	...	...	...	...	140
Dutch Guiana	...	...	...	...	...	...	...	...	1,915
Paraguay	...	...	...	...	51	38,311	...	...	...
Peru	8	10,315	...	...	40	52,849	...	...	14,865
Uruguay	4	7,466	...	...	294	241,250	...	...	21,035
Venezuela	9	4,530	...	...	41	42,119	1	800	9,262
Aden	7	12,425	1	1,796	124	144,467	2	5,210	28,602
China	...	...	...	...	...	...	...	...	200
Kwantung	...	...	...	...	...	...	...	...	2,145
Chosen	29	84,841	...	...	189	189,378	...	...	48,566
British India	25	55,628	...	...	123	126,622	...	...	38,793
Straits Settlements	1	2,849	...	...	12	12,460	...	...	1,323
Other British East Indies	76	161,979	...	...	236	270,911	...	...	65,000
Dutch East Indies	5	8,198	...	...	11	5,713	...	...	4,780
French East Indies	1	1,150	...	...	8	16,563	...	...	2,779
Hongkong	69	78,605	30	52,071	284	319,690	39	46,265	59,812
Japan	...	...	...	...	40	72,000	...	...	1,148
Russia in Asia	...	...	...	...	1	1,500	...	...	2,307
Siam	4	6,180	...	...	23	19,386	...	...	262
Turkey in Asia	32	56,046	...	...	83	116,521	24	23,661	176,287
Australia	28	40,424	...	...	439	480,017	...	...	72,796
New Zealand	...	...	...	...	5	6,185	...	...	57
Other British Oceania	...	...	...	...	2	3,000	...	...	1,001
French Oceania	...	...	2	900	3	1,800	...	...	67,676
Other Oceania	16	80,482	16	33,521	348	325,187	...	...	...
Philippine Islands	11	10,618	7	6,152	21	21,243	14	17,218	11,520
British West Africa	8	7,212	...	...	258	296,273	4	3,641	52,201
British South Africa	...	...	...	...	1	4,000	...	...	...
British East Africa	...	...	...	...	4	4,529	...	...	3,356
Canary Islands	...	...	2	2,200	...	...	...	...	285
French Africa	...	...	...	...	3	3,000	...	...	4,245
Madagascar	...	...	...	...	2	4,520	...	...	...
Morocco	...	...	...	...	4	2,800	...	...	2,077
Portuguese Africa	...	...	...	...	58	51,982	...	...	...
Egypt	...	...	...	...	...	...	...	...	...
Total	1,412	2,276,446	309	451,410	7,680	8,636,887	190	210,013	4,778,626

SHIPMENTS TO NONCONTIGUOUS TERRITORIES:	COMMERCIAL			PARTS	
	Number	Dollars	Number	Dollars	Dollars
Alaska	3	2,143	4	2,467	1,372
Hawaii	35	29,112	148	126,269	45,589
Porto Rico	45	88,659	130	238,556	61,989

Restrain Ford Use of K-W Spark Coil Ignition Company Wins Suit Charging Patent Infringement —Ford Files Appeal

INDIANAPOLIS, March 22—Judge Albert B. Anderson of the United States District Court has sustained the complaint of the K-W Ignition Co. of Cleveland, alleging infringement of patents owned by that company by the Ford Motor company. The decision was made after several days' hearing of evidence.

The judgment sustained the patent covering the K-W spark coil, extensively used on Ford cars, holding that the Ford company had infringed such patent. Further adjudication was referred to Charles Martindale, master in chancery, to ascertain and report back to the court the number of ignition units made, sold or used by the defendant company and the gains and profits and the damages suffered by the K-W company.

A perpetual injunction was issued restraining the Ford Motor company from making or selling the invention described, with the stipulation that in case of an appeal within 30 days the injunction be suspended and a bond of \$1,000,000 be filed, signed by the defendant company and Henry Ford and Edsel Ford, as sureties. The appeal was taken.

February Exports Show Sharp Drop

WASHINGTON, March 20.—A decided drop in exports was the outstanding feature of the February foreign trade statement issued to-day by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

February exports amounted to \$646,000,000, the smallest since October of last year, against \$722,000,000 in the preceding month of January and \$585,000,000 in February of last year. Exports during the eight months ended with February were \$5,231,000,000, against \$4,383,000,000 in the eight months of last year.

February imports amounted to \$467,000,000, against \$474,000,000 in January of this year and \$235,000,000 in February a year ago. Imports during the eight months period ended with February amounted to \$3,235,000,000, against \$1,933,000,000 a year ago. The imports during these eight months, representing two-thirds of the current fiscal year, exceeded by \$140,000,000 the imports during the entire fiscal year ended with June, 1919.

GRAHAM BUILDS NEW TRUCK

EVANSVILLE, IND., March 19—The Graham Brothers' speed truck, a local product, has a number of up-to-date features, among which is the bolting of the bumper to the frame, instead of riveting. The argument is that if the bumper strikes an obstruction and becomes bent, the straightening process is merely a

matter of removing four bolts and having the damaged part fixed at the nearest blacksmith shop; whereas if rivets were used the owner of the truck would in all probability indefinitely postpone the straightening.

Graham speed trucks are of 1½ tons capacity, with Continental four-cylinder, 3½ in. x 5 in. engine. A three-point suspension is used, and a thermo-syphon cooling system, with Long radiator. Ignition and lighting are by an Eisemann high tension magneto-generator set. Batteries are Prestolite of 60 ampere-hours capacity at 6 volts. A Monarch suction governor is fitted to the engine. The carburetor is a Stromberg. The clutch is the Fuller, as is also the gear-set, which has three speeds forward and one reverse. Front and rear axles are Torbensen. Front and rear springs are half-elliptic, made by the Detroit Steel Products Co. A Lavine steering gear and a Hartford universal joint of metal construction are also among the features.

Van Briggle Takes Over Bower Trailer

INDIANAPOLIS, March 23—The Bower Trailer Co. of Fowler, Ind., and the H. M. Smith Manufacturing Co. of Mooresville, Ind., have been taken over by the Van Briggle Manufacturing Co. of Indianapolis, which company has been incorporated with a capital of \$1,000,000.

The officers of the new company are L. H. Van Briggle, president; George A. Weideley, first vice-president; Frank Hilgemeier, second vice-president; U. Z. Wiley, secretary; Henry S. Rominger, treasurer; Joseph S. Sheperd, assistant treasurer. Van Briggle, Rominger, Hilgemeier and Wiley have been connected with the Van Briggle Motor Device Co. Weideley is vice-president of the Weideley Motors company.

The Bower trailer, according to Van Briggle, employs a patented device, preventing it from swinging from one side of the road to another. Hereafter it will be sold as the Van Briggle trailer. The factory at Fowler will be enlarged. The H. M. Smith company makes patent crates which are used in practically all the agricultural schools in the United States. Their manufacture will be carried on at Mooresville. The general offices of the Van Briggle company will be established in Indianapolis.

INCREASE FORDSON OUTPUT

DETROIT, March 19—Henry Ford & Son have begun operations in their tractor assembly plant at Des Moines, Iowa, and soon will be turning out 100 tractors a day at that plant. The only delay to scheduled production is in getting parts and materials, due in great measure to railroad congestion. With the Des Moines assembly plant in full operation the daily output of tractors will be increased to 550, the plant at St. Louis turning out 100 and the plant at Dearborn, Mich., shipping 350.

Officials of the Ford company to-day denied a report that an assembly plant would be opened at Colorado Springs.

Briscoe to Merge Bethlehem Truck

Plans for Combination of Two Corporations Await Final Action

DETROIT, March 22—Negotiations for the merger of the Briscoe Motors Corp. and the Bethlehem Motors Corp., are rapidly nearing completion, but the details of the combination are not yet obtainable. It is understood, however, that the stockholders of the two corporations will share in the distribution of securities of a new corporation but the proportions of the distribution have not been announced.

The Briscoe corporation has a capitalization of \$6,000,000. It was incorporated in 1916, succeeding the Briscoe Motor company which previously had acquired control of the Mason Motor Co., of Waterloo, Ia., Jackson Motor Parts Co., and the Jackson plant of the Lewis Spring & Axle Co. of Jackson, Mich. It controls six plants located in and about Jackson.

The Bethlehem corporation was incorporated in 1916 to manufacture motor trucks. The capital is approximately \$800,000. Its plant is located at East Allentown, Pa.

Trade Opportunities in Foreign Markets

WASHINGTON, March 20—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity Number.

An importer in Portuguese East Africa desires to purchase and secure an agency for the sale of light motor trucks and motor boat engines. Quotations should be given f.o.b. New York. Correspondence may be in English. Reference 32280.

An agriculturist and member of a commercial organization in Syria desires to receive catalogs, price lists and discounts on passenger cars and light and heavy automobile trucks. 32296.

An American firm which is about to send a representative to Russia, desires to secure the representation of firms for the sale of automobiles. References 32325.

A commission agent and wholesaler in Syria desires to communicate with exporters of automobiles and trucks. 32328.

FISK BUYS IN NEW YORK

NEW YORK, March 22—Fisk Rubber Tire Co. has added to the site of its proposed 24-story building at Broadway, Eighth Avenue and Columbus Circle, two adjoining sites. The latest purchases take in the properties at 956-8 and 960-2 Eighth Avenue.

Automobile Tire Exports by Countries for January

	Casings Dollars	Inner Tubes Dollars	Solid Tires Dollars	All Other Dollars
Austria	4,300	...	...	...
Azores and Madeira Islands	285	...	...	...
Belgium	123,114	3,229	3,108	2,096
Bulgaria	...	...	...	...
Czechoslovakia	...	...	...	...
Denmark	130,734	3,202	...	7,610
Finland	22,402	179	...	...
France	346,817	1,648	...	2,704
Germany	498	...	...	...
Gibraltar	98	...	...	...
Greece	28,770	322	...	898
Italy	45,998	...	...	9,296
Malta, Gozo, and Cyprus Islands	75	...	...	...
Netherlands	89,443	2,103	...	4,337
Norway	93,859	457	...	435
Poland and Danzig	1,531	...	...	...
Portugal	109,356	1,627	...	1,454
Roumania	78,515	2,788	...	...
Russia in Europe	1,750	...	...	...
Spain	107,004	...	...	1,113
Sweden	306,231	9,399	25	9,148
Switzerland	163,748	...	...	15,197
Turkey in Europe	65,753	...	...	385
England	61,934	292	16,359	13,970
Scotland	...	...	...	4,500
Bermuda	...	...	...	...
British Honduras	323	145	...	368
Canada	180,454	16,107	41,454	1,555
Costa Rica	1,343	...	...	92
Guatemala	2,212	220	...	...
Honduras	1,775	19	91	...
Nicaragua	1,683	...	...	...
Panama	20,869	59	...	1,947
Salvador	545	30	...	171
Mexico	39,530	5,998	3,931	2,453
Miquelon, Langley, etc.	...	...	...	...
Newfoundland and Labrador	170	293	...	...
Barbados	2,616	61	...	97
Jamaica	30,856	994	...	54
Trinidad and Tobago	3,868	88	...	21
Other British West Indies	2,304	250	...	159
Cuba	160,960	10,658	7,739	23,617
Danish West Indies	1,749	47	...	...
Dutch West Indies	980	...	...	12
French West Indies	15,834	25	...	290
Haiti	2,785	48	...	1,302
Dominican Republic	10,275	...	647	111
Argentina	138,197	1,635	...	870
Bolivia	4,645	...	...	...
Brazil	60,576	3,384	...	267
Chile	52,912	871	...	4,162
Colombia	8,447	483	...	2,528
Ecuador	5,324	...	...	...
British Guiana	2,839	850	...	...
Dutch Guiana	257	...	...	11
Paraguay	...	...	...	...
Peru	20,266	378	1,839	39
Uruguay	47,773	2,116	...	...
Venezuela	11,838	50	...	739
China	36,603	340	...	1,105
Kwantung	...	...	...	...
Chosen	...	...	...	...
British India	23,581	222	...	...
Straits Settlements	62,097	458	15,311	...
Other British East Indies	166	...	...	...
Dutch East Indies	56,717	1,075	3,835	327
French East Indies	...	...	...	...
Hongkong	1,725	...	...	...
Japan	11,897	1,542	8,366	...
Russia in Asia	...	...	...	...
Siam	3,675	...	...	...
Turkey in Asia	9,494	...	...	...
Australia	41,207	3,803	...	1,038
New Zealand	48,255	475	368	1,068
French Oceania	65	...	200	...
Other Oceania	204	15	...	...
Philippine Islands	131,397	14,812	18,696	9,457
British West Africa	33,662	23	...	131
British South Africa	4,627	...	...	698
British East Africa	7,453	...	...	...
French Africa	917	...	...	...
Madagascar	...	...	...	67
Portuguese Africa	...	...	...	...
Egypt	762	...	...	10
Total	3,090,924	92,320	121,969	127,919

SHIPMENTS TO NON-CONTIGUOUS TERRITORIES

	Automobile Tires	All Other Tires
Hawaii	\$145,074	\$5,706
Porto Rico	157,885	20,171

Tractor Exhibit to Have Four Settings

N. I. & V. A. Committee Decides on Change from National Show to Sectional

CHICAGO, March 20.—There are to be four national tractor shows during the coming year. This was decided upon at a meeting of the National Tractor Demonstrations and Shows Committee of the National Implement and Vehicle Association held in Chicago March 10. The dates and places for the national shows were not selected.

Selection of places and dates for the shows was postponed to give the committee an opportunity to secure more information on the provisions offered for local management of such shows, location, amount and character of space available, the price to be charged for them, provisions offered for publicity, and hotel accommodations.

For several years past it has been felt the idea of holding one national tractor show has been outgrown. It has been pointed out that tractors suitable for one section of the United States are not suitable to another, and it is also impossible to secure a representative dealer attendance from all parts of the country when the show is made one big exposition. Both the manufacturers and the dealers are behind this movement, and the abolition of the national show comes as a national outgrowth of the expansion of the tractor business.

While no definite plans for the four shows program have been completed it is understood that one of the shows will be held in some city in the East, another in the Middle West, another farther west, and the fourth somewhere in the Southwest. The determination of the cities which draw the exhibits will be based upon the provisions offered for local management and upon the other features of the situation which are now being investigated by the shows committee.

STOVER ADDS TO PLANT

FREEPORT, ILL., March 19.—The first unit of a group of buildings which will eventually cover the entire tract of 40 acres now owned by the Stover Gasoline Engine Co. of Freeport, has been completed. The dimensions are 77 x 460 ft. The structure will be devoted exclusively to the manufacture of hopper-cooled engines. The building formerly used for this purpose will, in the future, be utilized for the construction of fuel oil and heavy engines. The Stover company has at present 900 men on the pay-roll.

DIESEL DESIGN ADOPTED

LONDON, Feb. 26 (Special correspondence)—The American Chamber of Commerce in London is informed that the great engineering and shipbuilding firm of Armstrong Whitworth, realizing the vital interest of the rapid production of British merchant shipping, and the great

future of the Diesel engine for ship propulsion, have acquired a license to manufacture and sell in Britain and her Colonies two-cycle Diesel marine engines embodying the best features of the Sulzer system.

The two-cycle principle, the American Chamber points out, has been adopted on account of the proved reliability and efficiency of this type of engine, its high ratio of horsepower to size and weight, and its ability to run on the cheapest fuels now on the market. It is understood that engines of this type, aggregating over 600,000 b.h.p., have already been built, and the experience gained in regard to both design and manufacture will be available in the production of the new engines.

Crossley-Willys Merger Only Partial

LONDON, Feb. 27 (Special correspondence)—At the annual meeting this week of the shareholders of Crossley Motors, Ltd., in Manchester, it was explained by the chairman, Sir Kenneth Crossley, that Crossley Motors, Ltd., had made no financial amalgamation with the Willys-Overland Co. of America. All they had done was to exercise their option on the Heaton Chapel Works and to resell those works to the new company at a fair price.

The only direct connection between Crossley Motors, Ltd., and Willys-Overland-Crossley, Ltd., apart from their shareholding, was that he (Sir Kenneth) was the chairman and Letts the managing director of both companies. Despite a generally optimistic statement of the Crossley company's affairs, the shares perceptibly weakened after the meeting.

ENGLISHMAN.

HIGHWAY TRAILER EXPANDS

EDGERTON, WIS., March 19.—The Highway Trailer Co., Edgerton, Wis., will commence work March 15 on another large factory addition, to increase the daily output to 25 trailers. On March 1 the company held \$250,000 of certified orders on its books for immediate delivery.

The Continental Axle Co., an affiliated corporation, has reached a daily production of 18 axles and the installation of much new equipment at this time will make it possible to increase the output to approximately 50 a day by May 1.

Joint branch offices have been established at Toledo and Cleveland.

James W. Monhall is general manager of both concerns.

PROMOTE SWEDISH AIR LINES

NEW YORK, March 19.—Two air line companies offering service between Sweden and Finland are in course of formation, according to dispatches from Abo, Finland, published in recent issues of London newspapers. Of the two companies, one, the Svenskt Luftraffikbolag, is supported by Swedish capital, while the second, the Flygkompaniet, is being backed by English interests.

Define Classes for R. A. S. Tractor Trials

Prizes to Be Awarded for Seven Distinct Tests, Entries Close

March 27

LONDON, March 3 (Special correspondence)—Entries for the British 1920 tractor trials promoted by the Royal Agricultural Society, with whom the Society of Motor Manufacturers and Traders are collaborating, will now be accepted up to March 27.

Slight alteration has been made to the regulations and there are now seven classes instead of six as formerly. It will be noted that what was class 1 has now been divided up into classes 1 and 2, the first being for tractors of 24 hp. and under, the second for tractors of 30 hp. and under. The remaining classes remain unaltered, except as to their consecutive number, which has been altered in accordance with correction noted. The revised list of classes follows:

Class 1—First prize, gold medal and £20. Second prize, bronze medal and £10. Internal combustion direct traction engine not exceeding 24 hp., suitable for plowing 2 furrows, 10 in. wide by 6 in. deep.

Class 2—First prize, gold medal and £20. Second prize, bronze medal and £10. Internal combustion direct traction engines, suitable for plowing 3 furrows 10 in. wide by 6 in. deep.

Class 3—First prize, gold medal and £20. Second prize, bronze medal and £10. Internal combustion direct traction engine over 30 hp., suitable for plowing 4 furrows 10 in. wide by 8 in. deep.

Class 4—First prize, gold medal and £20. Second prize, bronze medal and £10. Direct traction steam engine plant, suitable for plowing 4 furrows 10 in. wide by 8 in. deep. Engines to comply with the Light Road Locomotive Acts.

Class 5—First prize, gold medal and £20. Second prize, bronze medal and £10. Internal combustion double engine set, with wire rope haulage for plowing 3 or 4 furrows 10 in. wide by 8 in. deep. Engines to comply with the Light Road Locomotive Acts.

Class 6—First prize, gold medal and £20. Second prize, bronze medal and £10. Double steam engine set, with wire rope haulage for plowing 3 or 4 furrows 10 in. wide by 8 in. deep. Engines to comply with the Light Road Locomotive Acts.

Class 7—First prize, gold medal and £20. Second prize, bronze medal and £10. Self-propelled plow for plowing not more than 4 furrows and not more than 10 in. wide by not more than 8 in. deep.

TRANSPORT PRICES RISE

MT. PLEASANT, MICH., March 19—The Transport Motor Truck Co. has advanced prices on the 1, 1½ and 2½ models. The 1-ton model is advanced from \$1,750 to \$1,850; the 1½-ton from \$2,050 to \$2,250, and the 2½-ton truck from \$2,585 to \$2,780.

Traction Engine Exports by Countries for January

Countries	Gasoline		Steam		Kerosene	
	Number	Dollars	Number	Dollars	Number	Dollars
Belgium	19	22,088	...	...	...	...
Denmark	3	3,153	...	...	...	...
France	613	371,477	...	...	373	147,907
Gibraltar	...	...	...	...	1	524
Netherlands	36	47,715	...	...	...	...
Norway	1	301	...	...	1	259
Poland and Danzig	17	16,770	...	...	...	...
Portugal	1	1,025	14	41,851	...	...
Spain	1	1,899	...	...	...	...
Sweden	55	56,721	...	...	...	...
Switzerland	1	1,625	...	...	6	730
Turkey in Europe	...	...	...	...	1	1,049
England	169	185,037	...	...	342	299,549
Scotland	1	785	...	...	...	...
British Honduras	...	...	1	765	1	128
Canada	226	164,642	1	1,600	392	300,441
Costa Rica	4	2,800	...	...	...	...
Guatemala	11	11,749	...	...	1	158
Honduras	...	...	2	11,455	...	...
Nicaragua	1	5,000	...	...	...	...
Salvador	...	...	...	...	1	247
Mexico	35	55,250	6	8,923	...	...
Newfoundland and Labrador	...	...	...	...	11	2,268
Jamaica	1	1,202	...	...	...	...
Cuba	19	54,343	7	7,866	9	11,166
Danish West Indies	...	...	...	...	1	150
Haiti	1	1,755	...	...	...	...
Dominican Republic	...	...	...	...	2	890
Argentina	23	26,802	...	...	134	24,178
Bolivia	9	3,519	...	...	...	...
Brazil	1	1,875	...	...	3	3,907
Chile	33	30,253	...	...	9	6,553
Ecuador	...	...	...	...	4	600
Dutch Guiana	...	...	...	...	2	1,200
Peru	28	19,016	1	1,838	1	2,012
Uruguay	14	10,210	...	...	...	...
Venezuela	...	...	...	...	1	95
China	1	3,050	...	...	2	964
British India	1	265	...	...	...	...
Straits Settlements	4	5,276	...	...	...	...
Other British East Indies	16	10,160	...	...	...	...
Dutch East Indies	19	23,245	3	7,100	...	...
French East Indies	3	1,878	...	...	...	...
Japan	6	3,782	1	1,926	...	...
Slam	2	1,278	...	...	2	732
Greece	2	2,900	...	...	...	...
Turkey in Asia	1	1,750	...	...	...	...
Australia	10	7,950	...	...	...	...
New Zealand	46	40,881	...	...	...	...
Philippine Islands	241	268,864	9	24,673	21	5,277
British West Africa	...	...	...	...	1	143
British South Africa	23	14,105	...	...	3	1,224
French Africa	2	10,122	...	...	...	...
Morocco	6	8,447	...	...	...	...
Total	1,706	1,500,965	45	107,997	1,325	812,851

PARKER EXPANDS PLANT

INDIANAPOLIS, March 18—The expansion of the capital of the Parker Tire & Rubber Co. from \$750,000 to \$3,000,000 and improvements and additions to the factory buildings will greatly enlarge the output of the plant here. Tentative plans call for an expenditure this year of approximately \$500,000 on the new main factory structure. The building will be

600 x 100 ft. two stories high, of steel, brick and concrete construction. On the factory plot, which is owned by the company, it is also proposed to erect a two-story administration building. With the addition, facilities for the employment of 1500 men will be provided. It is estimated that the output of cord tires within the next ten months will be increased to a daily average of about 500.

FOUNDRY ADDS TO CAPITAL

NEWARK, OHIO, March 18—At the annual meeting of the stockholders of the Newark Stamping & Foundry Co. the following directors were elected: J. N. Pugh, H. W. Moser, R. A. Gulick, Goodnow Johnson, R. G. Barber, D. F. Sites and F. Ball. An increase in the capital stock of the company from \$15,000 to \$30,000 was authorized.

French 12 Cylinder Car Soon to Appear

**Corona, Designed by Michaux, to
Sell for \$15,000—Has Five
Year Guarantee**

PARIS, March 6 (*Special correspondence*)—The first 12-cylinder car to be built in France will shortly be put on the market. This is known as the Corona, and is listed at \$15,000 for chassis only with tires, two spare wheels, tools and equipment.

The Corona has been designed by G. Michaux, a consulting engineer, who some years ago was responsible for the design of the small Peugeot racing cars. Cylinder dimensions are 3.1 x 4.7 in., the cylinders being cast in two sets of six, and mounted at an angle of 40 deg.—this latter arrangement being new in automobile practice. Valves are carried in cages in the head and are operated by means of camshafts in the base-chamber, pushrods, and rockers. All the valve operating mechanism is enclosed, the cover also hiding the spark plugs and the ignition wires. The crankshaft is carried in three roller bearings, with a double thrust ball race at the fly-wheel end.

One of the features of this engine is the dry sump oiling system. All the oil is contained in a tank around the base chamber, and is delivered to the bearings under pressure. The excess from the bearings, which falls into the base-chamber, is collected by a scavenging pump and returned to the oil tank. Fresh oil is poured in through a cap on the top of each cylinder casting.

In addition to this, there is a central oil tank in the dash, from which lubricant is delivered automatically to the gearbox, the rear axle, the front axle, the steering connections, shackle bolts and springs. No oil can is required on this car. Naturally, there is no return from the parts fed by the accessory tank.

Unit Construction Adopted

Unit construction of engine and gearbox has been adopted, with three speeds and reverse, center control, and either left or right hand steering. The drive shaft is enclosed, and there is a flexible metal cover around the universal behind the gearbox, allowing oil to be delivered from the gearbox to the universal, and from there to the rear axle. This latter is a full floating type, specially designed for rapid dismounting of the differential housing, the crown wheel and the driving pinion. Spiral bevel gears are used.

Brakes are fitted on all four wheels, the drums being 16½ in. in diameter and 2.3 in. in width. No brake operating rods are visible, and at the front the brake lever is passed inside the steering pivot. The stub axles are hollow, with a diameter of 2.5 in., which is also the diameter of the rear axle. The hubs are interchangeable front and rear, and detachable metal wheels are employed. The car has electric lighting and starting,

ignition by two magnetos with automatic advance, speed indicator and revolution counter, and an engine-driven tire pump.

The Corona is guaranteed for five years, this guarantee extending to any number of owners, providing the seals are not broken. After 60,000 miles running the makers undertake to completely overhaul the car at an inclusive charge of \$1,000.

Rumors of Motor Crisis Stir England

LONDON, Feb. 27 (*Special correspondence*)—The London *Daily Express* of Feb. 26 has a scare article under the title of "Motoring Trade Crisis," in which it is roundly stated that "nearly twenty makers (British) known to the writer are in difficulties," and some even on the point of bankruptcy." The cause is attributed to failure of optimistic plans of output to be realized. These difficulties, it is added, are not limited to the smaller and less known firms.

When in the Birmingham area this week, the writer failed to get corroboration of the more serious aspects of this rumor, but it was evident that credence was attached to rumors at large, or perhaps it would be safer to say that there is a suppressed state of unrest and anxiety and that much of it is the result of the unfortunate step in holding the Olympia show under the conditions prevailing.

ENGLISHMAN.

REORGANIZE FAN COMPANY

SOUTH BEND, IND., March 19—Reorganization of the American Aero Co. of Chicago, manufacturer of the Juelson two-bladed fan for automotive vehicles, has just been completed. The administrative offices of the company are now located in South Bend and the following officers have been elected for the year: F. H. Wellington, president; George M. Studebaker, vice-president; Paul V. Harper, secretary; F. H. Wellington, George M. Studebaker, Clement Studebaker, Jr., Edward S. Hyman and Edwin Juelson, directors.

NEW MORSE CHAIN OFFICES

ITHACA, N. Y., March 19—Two new offices have been opened by the Morse Chain Co., manufacturer of automotive equipment. A Baltimore office is located in the Lexington Building, under the management of E. R. Morse, and a Philadelphia office in the Harrison Building, under the management of M. H. Rodda.

FIRM TITLE CHANGED

MERRITON, ONT., March 19—General Forgings & Stampings, Ltd., is the new name of the Canada Pole & Shaft Co., Ltd. It has been deemed advisable to change the name owing to the fact that the business has changed from that of a pole and shaft business to that of an automobile forging and stamping business.

Fremont to Build New Passenger Car

**Company Takes Over Taylor
Motor Truck Co.—Plans
6-Cylinder Job**

DETROIT, March 19—Fremont Motor Corp., headed by R. T. Walsh, advertising manager of King Motor Car Co., and composed of Detroit manufacturers, has taken over the plant and assets of the Taylor Motor Truck Co., at Fremont, Ohio, and will build a six-cylinder passenger car. Final steps in the deal came yesterday in an order from the Federal court in Toledo, directing the receiver of the Taylor company to sell the assets to the new corporation.

The corporation is capitalized at \$2,000,000, all common stock of the par value of \$10, \$250,000 of which will be put on the market. The car to be manufactured will sell at \$1,850, and will be powered with a Falls engine and standard equipment. The new owners take formal control of the property to-day, and expect to be in production within a few weeks. The output of the plant for 1920 has been contracted for on an export order.

Formal announcement of the personnel of the new organization will be made following a meeting of the temporary board. The syndicate is the same as the one which last week secured control of the Fulton Motor Truck Co., of which Garvin Denby, former president of the Denby Truck Co., is the new president. The Gray Bond Co. of Detroit has underwritten the stock for the Fremont Motor Corp., and handled the financing of both deals.

The plant at Fremont, which covers 70,000 sq. ft. of floor space, was built by the Burford Motor Truck Co. The Taylor organization took charge of the plant three years ago, and installed considerable new machinery and equipment, but after a short period of operation went into the hands of a receiver. It was to clear title to these assets that the proceedings were filed in the Federal court to instruct the receiver to proceed with the sale.

Old Truck Material Sold

Included in the property secured was \$60,000 worth of materials for trucks. The new owners, however, found such a profitable market for the material that they decided it would be a wise plan to dispose of it rather than manufacture trucks. For the present production will be devoted entirely to passenger cars, though it is possible the corporation may take up the truck end later. The plant is fully equipped with modern machinery, and production will proceed as rapidly as materials can be secured. An addition increasing the floor space to 150,000 sq. ft. will be erected in the summer.

The new car was designed by F. M. Guy, chief engineer for the Apex Motor Car Co. at Ypsilanti, Mich. Guy was the originator of the torpedo body and the streamline.

N.A.C.C. Active in Motor Route Growth

Special Activity of Chamber Being Extended to Forming New Lines

NEW YORK, March 20—Broadening of the rural motor express movement is one of the subjects upon which most stress is laid by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, in a report to the directors upon the work being accomplished by the organization. It is pointed out, however, that big problems of readjustment and reconstruction are being met and solved in all branches of the automotive industry.

Intensive development of the motor truck as a means of marketing and interurban transportation has been undertaken by the motor truck division of the N. A. C. C. Among the activities noted by Reeves are:

Plans for supplying ten trucks for use by the engineering division of the National Research Council in an investigation to determine a basis for economical grades on rural highways.

Expansion of the rural motor express movement by the formation of the National Association of State Marketing Officials with membership from twenty states.

Operation of approximately 4,000 motor express lines in 48 states, covering routes from 6 to 250 miles long and using from one to twenty trucks.

Requests from universities for details of engineering courses in highway transportation.

Survey by Department of Agriculture

of motor trucks on the farm, showing more than 50,000 now in use.

Attendance by members of truck division of N. A. C. C. at hearings on truck line franchises in various states and an educational campaign to demonstrate the advantages of truck use.

Continued progress in the development of highways also was recounted by Reeves. Hearings will be held soon on the \$425,000,000 national highways bill. Alarm is expressed at the tendency in some states to pass highway bonding measures with the provision that interest on the bonds shall be paid from motor vehicle fees. The highways committee of the N. A. C. C. feels that road construction should be paid for from general funds because they benefit everyone, but does not object to motor vehicle fees being used for maintenance.

It is the open season in state legislatures for bills aimed at motor vehicles. Some of the more than 700 measures proposed are very drastic. South Carolina has passed a law imposing a fee of \$350 on seven ton trucks besides giving the highway commission authority to determine what trucks shall be used in the state. There is a tendency to restrict the size and weight of automobiles in Kentucky, Mississippi, New Jersey and Rhode Island.

Senator Pittman, chairman of the interstate commerce committee, has announced that attention will be given to a bill which would provide that when an automobile has complied with the registration laws of its own state it can travel legally in any other state.

American manufacturers have joined with British makers in devising a cable code in English of automobile terms which is expected to result in a big saving in cable tolls.

Soviets Slow Down

Harvester Output

Moscow Plant of International, Though Still Operating, Finds Conditions Difficult

NEW YORK, March 20—The régime of the Soviets in Russia has not halted the operation of the plant of the International Harvester Co., near Moscow. Throughout the changing conditions in the empire of the former czar production has been maintained steadily. It is perhaps the only big plant in the country that has not been nationalized.

There are 1,000 workers employed at the plant at the present time as compared with 2,000 in 1913. The output of the plant is far lower than in former years, however, indicating the slackening of morale which has crept in with government changes. Illustrating this it is shown that production now in a given time is but 800 as against 4,000 in a corresponding period in 1913.

There are 14,000 new machines in warehouses, according to most recent reports, which are lacking knives and without means for the present of procuring them. The machines, it is noted, are desperately needed for the 1920 crops.

PROVIDE FOR COAST MAILED

WASHINGTON, March 19—Appropriations of \$1,415,000 have been provided in the Senate Post Office bill for the purchase and maintenance of airplane mail service between New York and San Francisco via Chicago and Omaha.

An important provision in the bill allows the Postmaster General to contract with individual firms or corporations for airplane mail service between such points as he may deem advisable, providing the cost is not materially greater than by rail. The sum of \$60,000,000 is provided for inland transportation and this money is also available for contract airmail service.

The Secretary of War is authorized to turn over motor vehicles, airplanes and parts, together with machinery to the Post Office. By another provision in the bill, the Postmaster General is authorized to use these for the transportation of mail, and to make the necessary bills for replacement, maintenance, etc.

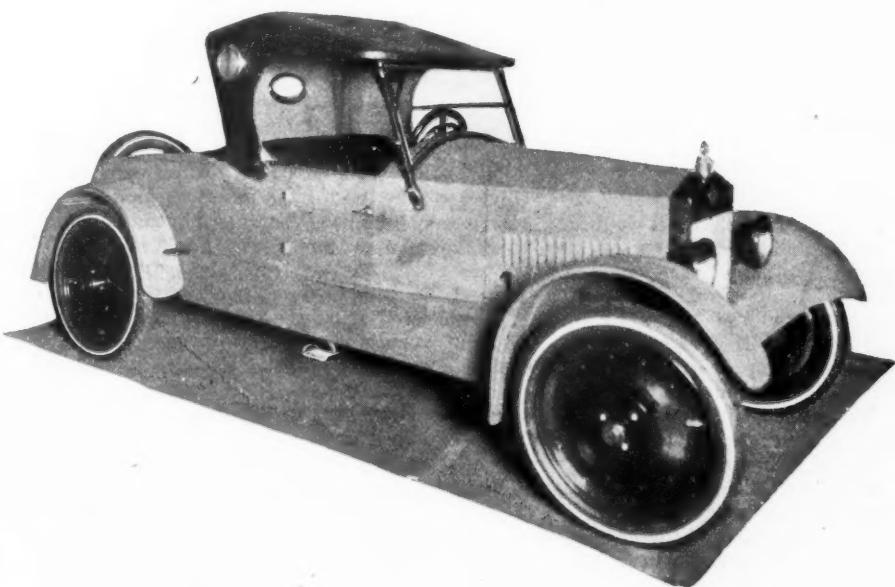
FIAT DENIES RACING RUMOR

NEW YORK, March 24.—Reports that the Fiat company intends to build special freak racing cars in the hope of lowering the world's flying kilometer record were denied to-day at the office of the company here. It was said the Fiat company has no short distance racing cars under construction.

MAY QUARANTINE STATES

WASHINGTON, March 24.—A public hearing to determine whether the states of Louisiana and Texas should be quarantined because of the appearance of the pink bollworm has been set for April 6 by the Department of Agriculture.

The Victory Car, a Boston Product



The Victory car, an assembled job, on a 115-in. wheelbase, is made in two- and four-passenger roadster and brougham models. The factory is in Boston

Gasoline Prices a Bogey, Says Reeves

No Cause for Alarm, Says Manager of N. A. C. C.—Reaffirms Economy Campaign

NEW YORK, March 24—Fear of skyrocketing gasoline prices in the near future is more or less of a bogey, in the opinion of Alfred Reeves, general manager of the National Automobile Chamber of Commerce. He said to-day that while prices undoubtedly will continue to advance they will not go up by leaps and pointed out that even if there was a jump of 5 cents a gallon it would mean an addition of only \$20 a year to the bills of the average motor car owner.

In the investigation which he has been making for the N. A. C. C. he has found indications of profiteering in some sections of the metropolitan district, Reeves said. While the latest wholesale price fixed by the Standard Oil is 28½ cents a gallon, the retail price in Greater New York ranges from 31 to 35 cents. The lower price would represent a fair profit. Attempts to take an unfair advantage of customers will soon be abandoned, Reeves thinks, because car owners will refuse to patronize the men who demand too high a margin of profit.

One solution of the problem is to preach gasoline economy, day and night, Reeves believes. He said the N. A. C. C. had urged the National Automobile Dealers' Association to conduct a nation-wide campaign for a uniform charge of \$1 for adjusting carburetors, on the theory that this step would result in a large saving of fuel. Another advantage would be that the dealer would be brought into constant contact with his customer.

Reeves explained that a reasonable increase in gasoline prices was to be expected, and that the cost probably will continue to creep up gradually unless new sources of supply are found in Mexico. The most serious phase of the situation so far as the automotive industry is concerned, is the rapid extension of oil burning engines on ships and on shore.

Pierce-Arrow Shows Drop in Earnings

NEW YORK, March 25—The annual report of the Pierce-Arrow Motor Co., issued yesterday, shows net profits for 1919 after charges and Federal taxes of \$2,491,070, or \$6.75 a share on its common stock after deduction of preferred dividends, which contrasts with \$7.86 a share earned in 1918.

Net earnings, the report shows, were \$3,161,122 against \$4,273,172 for 1918. Federal taxes totalled \$600,000 as against \$1,200,000. Preferred dividends of \$800,000 were paid and \$312,500 on the common, contrasted with \$1,562,500 in 1918. The surplus for 1919 was \$1,378,570 and the total surplus to December 31, was \$3,571,570.

"Necessary war expenditures in buildings and machinery have left the com-

pany with facilities in excess of normal requirements," President Jay told stockholders in his annual statement. "Time will be required to make the necessary adjustments for the proper utilization of these facilities. Plans for the present contemplate increased production in passenger cars and trucks which should result in a reduction of overhead expenses and lower costs."

The Horse's Knell

DENVER, March 23—Horses will be banished from the streets of Denver after Jan. 1, 1925, if an ordinance now before the City Council is passed. The measure provides that no horses, cattle, sheep or swine shall be kept within the corporate limits of Denver or driven upon the streets.

Car Increases Make Gas Rise Inevitable

WASHINGTON, March 19—Higher prices for gasoline are foreshadowed by a report issued to-day by the Bureau of Mines. Gasoline production, according to the report, increased 10 per cent in 1919. Automobile registrations, according to figures secured by AUTOMOTIVE INDUSTRIES, increased 23.2 per cent during the year. And as the quantity of gasoline in storage has been increasing slowly while sales of automobiles promise even greater increases this year, it is inevitable, state various officials, that gasoline, by reason of the demand, will advance in price.

On Dec. 31, 1919, 292 refineries were operating with a daily capacity of 1,356,355 bbl. of crude oil. In 1917 there were 245 companies producing 1,157,875 bbl. daily, and in 1918, 267 concerns refined 1,226,175 bbl. a day. Ninety-nine new refineries are in process of construction and will be in operation by August, 1920. Texas leads in new construction with 50 plants with daily capacity of 141,000 bbl.

Must Sue Without Inspection of Books

NEW YORK, March 25—The United States Supreme Court has declined to review the proceedings of the United States District Court and the United States Circuit Court of Appeals, in the petition for the right to inspect the books of the B. F. Goodrich Co., and the Firestone Tire & Rubber Co., sought by Louis De F. Munger.

The right to inspect the books, sought as a preliminary to a suit for infringement of demountable rim patents, was denied in the Federal courts until such time as the proceedings of the actual trial warranted. William A. Redding, of the law firm of Redding and Greeley, counsel for the plaintiff and appellant, said the suit for damages would be moved in Federal court in New York in September or January, 1921.

Alleges Oil Firms Seek Trade Control

Texas Attorney Finds Danger of Automobile Business Passing to Refiners

AUSTIN, TEX., March 22—Information has been placed in the hands of the State Attorney General's Department by T. J. Newton, county attorney of Bexar county, at San Antonio, alleging that combines have been entered into by several of the large oil corporations operating in Texas for the purpose of not only controlling the price of gasoline but of exercising control over the prices of automobiles and automobile accessories. He asks that the Attorney General institute suits against these companies for alleged violations of the anti-trust laws of Texas. Attorney General C. W. Cureton took the matter of prosecuting the oil companies under advisement.

Newton charges that these large oil companies are reaching out to control the automobile business, in addition to controlling the prices of their own products. He said that in San Antonio and elsewhere in Texas the big oil companies have installed automobile equipment supply houses in connection with their gasoline filling stations.

In speaking of the situation, Newton said:

"From what I can gather the oil companies are seeking to establish a complete monopoly of their products, and prices checked by the enforcement of our anti-trust laws and laws against monopolies, will eventually absorb or force into retirement, all independent refineries and all of the distributors not in with them, and the consumer will hold the bag."

He declared that under both the State and Federal laws it is possible to check the further operation of combines, saying:

"Just Another Packers' Trust"

"Under the laws of the United States and the State of Texas a check can be placed upon these oil companies. These laws must be put into operation without delay, otherwise, ere long, the consumer will not only have to buy his equipment and supplies from the oil companies, but they will also have to look to the oil companies for their automobiles. Just a repetition of the 'Packers' Trust'."

"The Attorney General's Department had made some investigation of the question, prior to 1918," he said. "I supplied results of an investigation covering the period since that date, and tendered my services and information to him, and asked him to either come personally to San Antonio or send a representative here to begin a further inquiry, if he deemed it necessary before taking legal action."

Newton believes that the information he had at hand is sufficient to authorize legal proceedings and favors immediate institution of suits which he believes will result in either dissolving the big companies or compelling them to reduce prices.

Tractors in Demand in Foreign Climes

Consular Reports Show Strides in Agricultural Development in Many Parts

WASHINGTON, March 24—Increasing demand for tractors in various parts of the world is recorded in consular reports received by the Department of Commerce.

The sugar cane crop in Cuba is the only one which justifies the use of tractors and about 1000 are in use on the island. The round wheel and crawler types are about equally popular. The small farm tractor is the best for size. Most of the sugar lands are rented out in small parcels by the owners of large estates. Long time credits are extended to purchasers by dealers, necessitating the granting of credits by the exporters.

Little progress has been made in Beluchistan and northwestern India in the application of scientific farming methods. Most of the plowing is still done by bullocks. Plans for extensive irrigation are maturing rapidly and when they are put into effect probably will stimulate the demand for tractors. British manufacturers are finding difficulty in making deliveries and for that reason American makers will find their road to business easier. Time of delivery is at present an even more important factor than price.

Tractors have been introduced on the island of Martinique to such an extent in the past two years that use of the mule to drag heavy loads has almost ceased. About seventy tractors are now in use to haul heavy freight and do work about the factories. One crawler has been imported, possibly for plowing purposes. The highways of Martinique are suitable for motor vehicles and therefore favor the use of tractors for hauling.

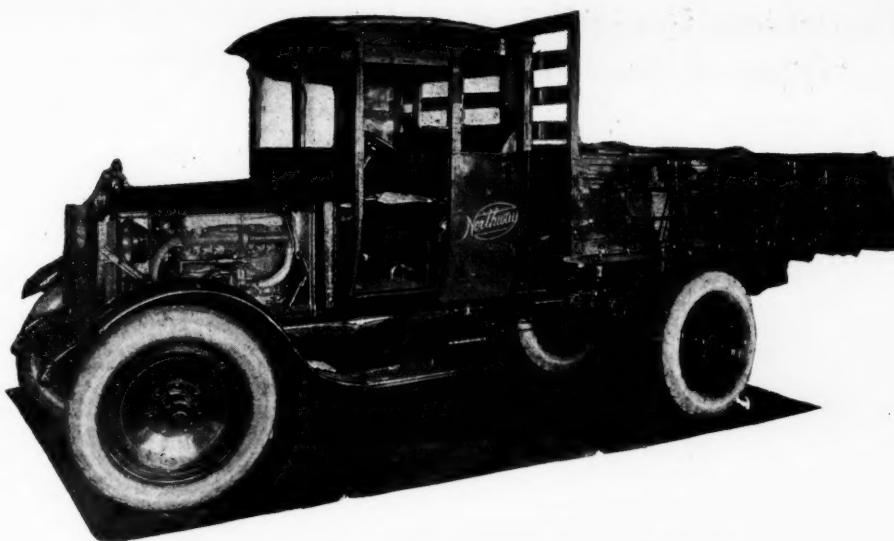
Malaga makes a good distributing center for tractors as most of the country is rolling and hilly. The tractor most adaptable to this region is one suitable for use on hilly ground. One not exceeding four feet in height would be most useful so that it could be used for cultivating between the olive trees without injuring the low-hanging branches.

NAVY GETS AIR FUNDS

WASHINGTON, March 19.—Appropriations amounting to \$15,800,000 for Naval aviation are contained in the Navy appropriation bill reported to the Senate by the Naval Affairs Committee. The appropriations authorize small seaplanes, dirigibles and six aviation bases in continental United States on sites to be selected later.

TRUCKS SUPPLANT RAILROAD

KANSAS CITY, March 24—Motor trucks are being used successfully to fill the needs of the communities along the Kansas City Northwestern Railroad, which suspended operations several months ago. It was the first test of the truck as a substitute for the railroad in



The Northway, New Massachusetts Truck

The Northway truck, manufactured at Natick, Mass., is being produced in 2- and 3½-ton models

this section. Two regular trucking lines are in operation on the highways to Tonganoxie, Kan. They make daily trips from Kansas City carrying foodstuffs and other merchandise to the towns along the way, doing contract hauling for merchants and farmers. Much of the live stock marketed in Kansas City is brought in by trucks.

France Lays Plans for Aerial Routes

NEW YORK, March 24—Six international aerial routes have been proposed by France, according to a recent announcement by M. Flandin, Under-Secretary for Aeronautics of that country, the details of which have just reached this country. State subsidies, the information sets forth, will be granted to French companies employing French pilots and mechanics, and landing places will be established on air routes throughout France. These will be mapped out by the State Director of Aerial Navigation.

The proposed international routes are as follows:—

Paris-Abbeville (for London)
Paris-Tours-Angouleme-Bordeaux-Bayonne (for Spain)
Paris-Valenciennes (for Brussels)
Paris-Strasbourg (for Central Europe)
Paris-Dijon-Lyons-Marseilles-Balearic Islands (for Algiers)
Paris-Nice-Corsica (for Tunis)

SCHWARTZ TRUCK TO BUILD

READING, March 24—The Schwartz Motor Truck Corp. announces that work will be started this spring on its plant, which will be located on a 10½-acre site in this city. The floor space which will be required to house the various departments will approximate 90,000 sq. ft. The company is capitalized at \$1,500,000, with Henry B. Schwartz as president and general manager.

New York to Cut Down on Publicity

Publishers' Association to Give Space Only to Items of Real News

NEW YORK, March 24—The path of the publicity man threatens to become increasingly difficult in the metropolitan district, partly as the result of a boast made by an automobile company that it had obtained an unprecedented amount of free publicity in connection with the New York show.

L. B. Palmer, general manager of the Publishers Association of New York City, said today that the entire subject had been referred to a special committee which has not yet formulated its report. Palmer said, however, there was little doubt the committee would advise that all kinds of publicity be scanned hereafter with the utmost care.

The publishers have been actuated in their stand, he stated, by the scarcity of print paper which has necessitated a general cutting down of the space devoted both to news and advertising. He gave it as the general opinion of New York publishers that they were giving altogether too much room to publicity in which the news value was negligible. It was explained however, that there was no intention of placing an embargo on actual news relating to the automotive industry.

ENTER TRUCK TOUR CONTEST

OMAHA, March 22.—Several large manufacturers of motor trucks have promised entries in the National Motor Truck Reliability Contest. The Douglas Motor Car Co. of this city and the Napoleon Motors Co. of Traverse City, Mich., have led the way with entries. The date for the "run around the money belt" has not been set but will be decided after the trip of the pathfinder.

Townsend Road Bill Opposed on Coast

Road Building in Public Land States Threatened by Measure, Oregon Says

PORTLAND, ORE., March 20—War on the Townsend bill creating a Federal highway commission, now before Congress, was declared at a state-wide conference of good roads workers of Oregon held here at which it was asserted that the passage of the Townsend bill would seriously handicap, if not kill outright, so far as Federal assistance is concerned, the road building programs now under way in Oregon and other public land states.

The Oregonians propose a defensive alliance of all the public land states against the Townsend bill and for the Chamberlain bill, appropriating \$100,000,000 a year for five years to continue the present federal co-operation with the states.

In 1916, the Oregonians point out, Congress passed the first Federal aid road law, appropriating \$75,000,000. In 1919 this was amended and \$200,000,000 was appropriated. Out of this \$275,000,000, Oregon's share is \$4,332,178.27. Unless there is another appropriation the last of these funds will be distributed by June 30, 1921. Congress is now asked to appropriate \$100,000,000 for five years in addition to the post road money, and this appropriation must be approved at the present session, they assert, if the present scope of road work is to be carried on.

Under this \$100,000,000 a year measure, which follows the program approved by the Louisville, Ky., convention of state highway engineers and commissioners, held last December, Oregon would receive \$1,576,152 for five years, and \$700,000 a year from an appropriation of \$10,000,000 a year for ten years, for the building of county and state roads within the national forests. In the past Oregon received \$596,000 of the \$3,000,000 forest road fund, which will be exhausted June 30.

Bill Centralizes Road-Building

The objections made by Oregon and the other public land states to the Townsend bill are that it centralizes road building of the government in the hands of a few men and does away with the co-operation between state highway commissions and the government which now exists; that practically none of the public roads in Oregon and the other public land states can qualify under the Townsend bill specifications whereby states will be reimbursed for construction of roads already built; that there are many such roads in the eastern states, which would accordingly obtain a big bulk of the money; and that, in short, it does not take into account the peculiar road building problems of the western public land states, with vast areas of government lands withdrawn from taxation, and completely upsets the

road programs of these states, so far as Federal aid is concerned.

Oregon is at present carrying out a road building program which by the end of next year will have expended \$30,000,000, including Federal aid under the present co-operative system. A measure appropriating an additional \$10,000,000 bond issue for roads is before the voters at the primary election in May.

British Erect Towers for Mooring Airships

LONDON, Feb. 19 (Special correspondence)—According to the American Chamber of Commerce in London, the steel towers now in course of construction at the Vickers' Barrow works, will enable airships moored to them to be supplied with fuel, water, gas and goods, while the crew and passengers will also go aboard from the tower.

When completed, says the Chamber, the construction will be about 150 ft. high, and will consist of steel lattice work. The Vickers' design is furnished with a revolving head, to which the airship will be closely moored, bow on, and float clear of the ground. The vessel will thus swing to the direction of the wind, protection from which is provided by the stream-line shape of the body.

A winch and cable will bring the airship to the tower head and an elevator inside the tower will carry crew, passengers, fuel, cargo, etc., to the vessel. At the top of the tower a small compartment serves as an anteroom to the airship, which will be connected to it by a flexible enclosed gangway.

When an airship is making for the tower, it will announce its intention by wireless, and an ingenious system has been devised for bringing it safely to its landing place. The automatic mechanism for releasing the vessel from the tower will be controlled by one man, and not more than three men altogether will be required to bring a dirigible to port and send it out again.

The American Chamber in London understands that a number of these towers are expected to be ready shortly and British airdromes will be immediately supplied with them. A further point of considerable interest to the public is the reported intention to build mooring mast waiting rooms at the foot of the tower which might be easily developed into hotels.

CHANGE FIRM TITLE

MILWAUKEE, March 19—The Mechanical Equipment Co., Milwaukee, has changed its name to Milwaukee Press & Machine Co. and increased the capital stock from \$50,000 to \$65,000. It was established six months ago by expert toolmakers formerly with large automotive concerns and is engaged in manufacturing punch presses and other machine tools, as well as mechanical appliances. A new plant will be erected and equipped during the spring and summer. Adam Siska is president; Theodore Zetterlund, vice-president, and Griffith K. Johnstone, secretary and treasurer.

N.A.C.C. Seeks Data on Timber Supplies

Will Endeavor to Locate New Sources With View to Lessening Costs

NEW YORK, March 20—To insure continued supplies of proper wood for the automobile industry, the National Automobile Chamber of Commerce has interested the Forestry Service of the United States Department of Agriculture to the extent of making investigations and endeavoring to get reliable facts and figures.

Last fall questionnaires were sent out to the trade asking about the kind of wood and the amount used in wheels, bodies, floor boards, seat boxes, running boards and bows; just how the wood was bought, dried and used. A second letter has been sent to bring the matter up to date and it is hoped that at a meeting to be held in Washington soon with the various associations representing wood users including the N. A. C. C. the matter can be discussed in detail.

Many industries in the United States, which, at the present time depend upon hardwood lumber or hard wood in other forms as a part of their raw material are experiencing a great deal of difficulty in securing the needed supplies. This is true particularly in the furniture industry, the automobile industry, the railroads and the vehicle manufacturing. It is also true of the general public in its demand for building and construction.

Rapidly increasing prices have, during the past two years, accompanied the growing shortage of hard wood timber. Hard wood lumber prices, during the past year, have increased from 200 to 300 per cent. On practically no grade has the increase been less than 200 per cent. On quartered white oak, for example, mill prices have increased from \$97 to more than \$300 per thousand.

Veneer Industry Cuts into Supply

The growth of the automobile industry has been so rapid and changes in requirements have been so frequent and radical that little data is available on its requirements as to amount. The species most in demand are those which are also in great demand by other industries. The veneer industry used almost half a million feet of material in the form of logs and flitches in 1911 and it is believed that the requirements have greatly increased since that time. Nearly 90 per cent of the total requirements are for hard wood.

One of the first steps toward making adequate provision for the future, says the National Automobile Chamber of Commerce, must be to ascertain what our present timber supplies are, how much young timber there is and how fast it is growing, what the requirements of our various industries and our general public are in quantity and quality, and to formulate plans so far as the forest land available will allow for a production of hard wood timber sufficient to meet our demands.

Royal Air Force Gets \$101,000,000

Civil Aviation to Get \$4,500,000 and \$2,500,000 for Inventors' Rewards

NEW YORK, March 23—The Royal Air Force of Great Britain will have a force of 29,730 men and the total expenditures will be £21,056,930—roughly \$101,000,000 at the normal rate of exchange—for the fiscal year 1920-21, according to information reaching here today from London. These estimates, which have just been issued in the form of a White Paper, include the sum of £894,540—nominally something less than \$4,500,000, for civil aviation and a further item of £500,000—about \$2,500,000—as "rewards for inventors."

These estimates, although a heavy reduction from the totals for the present fiscal year, evidence the feeling of necessity in England for a continuation of airplane development. Roughly, the proposed expenditure is one-third of that for the present year and the force of officers and men something like one-fifth of the 1919-20 strength.

The importance of the White Paper is that Great Britain finds it valuable to continue a heavy aviation force because of the continuing necessity for research, experimentation and the building up of commercial routes. The experimental and research activities are given £2,575,540 and the amount for technical stores is placed at £6,172,850. The Air Ministry is allotted a sum of £877,000.

The amount for works, building and land for military service is £3,647,000 while under the same heading for civil aviation is £415,000, of which more than a third will be expended for the development of aerial routes. Two other interesting items are those providing £28,500 for flashing lighthouses and £315,000 for the airship constructional establishment.

OVERLAND ADDS \$25,000,000

TOLEDO, OHIO, March 25—Willys-Overland Co., will increase its capital stock by the issuance of \$25,000,000 of common stock, as per the authorization of stockholders at a special meeting yesterday. With this issue the capital stock will be \$100,000,000 of which \$25,000,000 is common. The issuance of another \$25,000,000 in junior preferred was deferred in view of changed conditions and the interests of the present preferred and common stockholders.

OSHKOSH TRUCK EXPANDS

OSHKOSH, WIS., March 15—Arrangements providing for the expansion of the Oshkosh Motor Truck Co. of Oshkosh, Wis., into one of the leading commercial car producers in the Central West have been completed by the company with the backing of the Oshkosh Association of Commerce.

A site of 35 acres at Twenty-fourth and Oregon streets has been purchased, and work will begin April 1 on the erec-

tion of a factory building, 80 x 300 ft., and an office building, 40 x 60 ft. Room for from ten to fifteen units of similar size is available.

A new corporation with \$125,000 capital has been formed by stockholders and other citizens of Oshkosh to finance the purchase of site and construction and equipment of the factory. The present works will be transferred to the new plant when it is completed about June 15.

Financial News

Avery Tractor & Implement Co., Peoria, Ill., has increased its capital stock from \$3,500,000 to \$15,000,000 distributed in the proportion of \$5,000,000 preferred and \$10,000,000 common.

Manitowoc Plating Works, Inc., Manitowoc, Wis., has increased its capital stock from \$35,000 to \$75,000.

Hanson Motor Co., Atlanta, will increase its capital stock from \$1,000,000 to \$1,500,000.

Rome Wire Co., Rome, N. Y., will increase its capital stock to \$4,000,000 in 7 per cent first preferred and \$5,600,000 common stock, the shares to be of \$100.

J. I. Case Threshing Machine Co.—Gross sales in 1919 totalled \$32,342,653 compared with \$25,162,769 in 1918. After preferred dividends there remained a balance equivalent to 22.3 per cent on the common stock.

Packard Motor Car Co.—Directors declared a quarterly dividend of 2 per cent on the common stock, reducing the rate from 10 per cent to 8 per cent.

Stevens-Duryea—An initial quarterly dividend of 1 1/4 per cent has been declared on the preferred stock.

Mutual Tire & Rubber Co., has declared an initial dividend of 1 per cent, payable April 19 to stock of record March 27.

Rainier Motor Corp., is soon to issue 30,000 additional shares of no par value common stock and \$700,000 of 8 per cent cumulative preferred stock, par \$100, all of which has been purchased by a syndicate headed by John Nickerson, Jr.

B. F. Goodrich Company—Stock Exchange has admitted for dealings 600,000 shares of common stock of no par value in exchange for 600,000 shares at present outstanding of \$100 par value.

The Pennsylvania Rubber Co. will pay the regular quarterly dividend of 1 1/4 per cent on preferred stock and 1 1/2 per cent on common stock March 31 to stockholders of record March 15.

Standard Tire Company—Declared initial quarterly dividend of 1 1/4 per cent on preferred and 1 1/2 per cent on common.

Stutz Motor Company—Announces earnings are running at the rate of about \$2,000,000 annually.

Saxon Motor Car Corporation—President Pfeffer says conservative estimates indicate earnings for 1920 of \$1,000,000.

Harper-Bean Output Grows 25 Per Cent

Total Output in February Is 351 Chassis; 65 More Than January

LONDON, March 11 (*Special correspondence*)—The Harper Bean February output shows an increase of 25 Bean chassis, 20 Vulcan chassis and 26 Swift chassis, as compared with the January output. The figures are 125 Beans, 180 Vulcans and 46 Swifts, making a total output of 351 chassis, as compared with 286 for January. The policy of this combine in publishing monthly its output is being favorably discussed and may stabilize public confidence which in other directions is less secure because of the combined disappointments as to delivery and unstable prices.

Goodyear Begins Work on Big Plant in Brazil

AKRON, OHIO, March 24—The Goodyear Tire and Rubber Co. has decided to establish a branch factory at Rio de Janeiro, Brazil. Construction of the plant, which already has been begun, will be completed in 1922. The capacity will be about 1000 tires a day and the employees will number about 1000. Classes for the training of the personnel in the Portuguese language will be started soon in Akron, where most of the workers will be recruited.

Miles Sails to Study European Conditions

NEW YORK, March 23—Samuel A. Miles, manager of the New York and Chicago shows, sailed for Europe to-day on the Mauretania to make several investigations for the National Automobile Chamber of Commerce.

Among the matters to which he will give his attention is the "international" association of automotive interests, with which the N. A. C. C. has never thus far affiliated. He will also go into the show situation and ascertain the reasons behind a reported movement in Europe for the discontinuance of the motor shows.

He will visit England, Holland, Belgium and France and will be abroad two months. He will also gather information on pertinent subjects for the American Automobile Association.

DESIGN NEW PISTON RING

DETROIT, March 22—Grundy Manufacturing Corp. of Detroit, manufacturers of Permaseal piston rings, have brought out an oil wiping ring for use in engines giving trouble from over-lubrication. It is the same as the Standard Permaseal ring except that it has a groove machined in it, which wipes off excess oil and returns it to the base of the engine. The Permaseal oil groove ring is now in production.

Car Shortage Cuts**Delivery of Steel**

PITTSBURGH, March 24—Car shortage continues to be one of the dominating factors in the production of steel. Because of the difficulty in finding delivery facilities, many mills have been forced to cut operations, while practically all of them report large accumulations of finished material. With the steel in warehouses it is impossible to meet requests for immediate shipments.

The skies are brightening, however, for the approach of spring will inevitably result in an improvement in traffic conditions. The most serious contingency for the next fortnight is the virtual certainty of floods in many parts of the country with the breaking up of great accumulations of snow and ice.

Once the supply of cars approach something like normal the mills feel they can rapidly cut down the accumulation of unfilled orders which have been pouring in from all parts of the country. The great difficulty in this respect is that many of the railroads actually are short of rolling stock. This can be remedied only by purchases from the equipment companies with another increase in the demand for steel. Few large orders have been placed thus far except for locomotives.

The automotive industry is one of those in the worst plight because of unfilled orders. While some of them have accumulated small reserve stocks nearly all of them are urging immediate shipments to meet increasing demands.

DELAWARE INCORPORATIONS

WILMINGTON, DEL., March 22.—The following corporations have been chartered under the laws of Delaware:

Simms Motor Car Corporation, with a capital of \$2,500,000, to manufacture and sell automobiles and parts. The incorporators are M. A. Bruce, S. E. Dill and T. L. Croteau of Wilmington.

Rubber Corporation of America, with a capital of \$2,000,000, to manufacture, sell and deal in rubber and its products. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, all of Wilmington.

Claude Carburetor Co., Inc., with a capital of \$500,000, to manufacture and sell carburetors. The incorporators are Samuel F. Howard, Harry C. Hand and Robert K. Thistle, all of New York.

Millman Motor Corporation, with a capital of \$400,000, to manufacture and sell automobiles. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, all of Wilmington.

Craig-Hunt Motor Co. of Wilmington, with a capital of \$3,000,000, to manufacture motors and trucks. The incorporators are F. L. Buehler, George G. Steigler and E. E. Aberle, all of Wilmington.

Safety Auto Light Corporation, with a capital of \$100,000, to manufacture motors, engines, etc. The incorporators are Edwin L. Newcomb of Brooklyn, N. Y., Herbert E. Latter and T. L. Croteau of Wilmington.

Current News of Factories**Notes of New Plants—Old Ones Enlarged****JOHNS-MANVILLE BUILDS**

MILWAUKEE, March 19—The H. W. Johns-Manville Co. has broken ground for its new works at Waukegan, Ill., which will involve a total investment of \$5,000,000, and supplant the present main plant in Wauwatosa, suburb of Milwaukee. The company manufactures a varied line of automotive equipment, asbestos goods, etc.

PAWNEE TIRE BUYS PLANT

CEDAR FALLS, IOWA, March 19.—The Pawnee Tire & Rubber Co., which was incorporated at Sioux City recently with a capital stock of \$1,500,000, has purchased a factory building here and expects to start operations during the coming summer. The Pawnee company has been maintaining offices and a salesroom at Waterloo, adjoining Cedar Falls, for several months. The plant purchased includes six acres of land, a four-story factory building and an office building.

BOLLSTROM MAKES FIRST TRUCK

ST. LOUIS, MICH., March 19.—Bollstrom Motors, Inc., sent their first four-wheel drive truck through St. Louis streets Monday. J. B. Dick, factory manager for the company, in an address at a banquet tendered officials in the evening, said production would start immediately.

COVERT GEAR ADDS UNIT

BUFFALO, March 22.—The Covert Gear Co. of Lockport, N. Y., is building a three-story concrete and brick factory building, costing \$270,000. The new building is near the ones already in use. It will be devoted to the making of gears and will increase the capacity of the plant 40 per cent.

WESTINGHOUSE BUILDS

PHILADELPHIA, March 19—The Westinghouse Electric & Manufacturing Co. has contracted for the erection of four new buildings at South Philadelphia, Pa. The extension is intended to take care of the immediate needs incidental to the removal of the machine works, formerly the Westinghouse Machine Co. of East Pittsburgh, Pa. Nearly all of the machinery will be transferred from the machine works at East Pittsburgh and will be directly driven by motor.

MUTUAL MOTORS MOVES

NORTH TONAWANDA, N. Y., March 20—The Mutual Motors Co., maker of the Marion-Handley car, has moved from Jackson to North Tonawanda.

World Markets Open for American Cars

NEW YORK, March 24—Trade conditions throughout the world, except where they are dominated by the unfavorable exchange rate, are becoming increasingly favorable for the American manufacturer, according to authoritative information gathered by the Guaranty Trust Company.

In the British Isles galvanized sheets are scarce and increasing stringency is reported in the pig iron situation. In the general iron and steel industry there seems no possibility of overtaking the demand for years to come.

The long and disastrous drought in the Union of South Africa has been broken and motor vehicles are in great demand. Iron foundries are reported to be in a satisfactory position, and trade experts advise the erection of blast furnaces on a modern scale.

France is in the market for American motor cars, trucks, tractors, motorcycles and automobile parts.

There is a great demand in Greece for tractors and motors of from 10 to 200 hp.

The commerce of Chile is showing steady improvement. An aerial transport service has been established between Santiago and Valparaiso by a Franco-Chilean company, which will make three trips a day. A passenger motor car service to and from labor centers also has been opened.

Trade between the United States and Ecuador will be facilitated soon by the opening of regular sailings between New York and Guayaquil by 2000 ton boats of the Blue Diamond line. The government proposes to establish an aviation school and would consider an offer of machines accompanied by instructors.

With the gradual development of good roads, motor cars are becoming increasingly popular among the native officials and prosperous merchants of China.

WISCONSIN TOOL CHANGES

MILWAUKEE, March 19—The controlling interest in the Wisconsin Tool & Supply Co., Milwaukee, has been acquired by Harry E. Jacobs, Edward J. Walzer and William H. Lawton, who will continue the business as manufacturers of machinery, mechanical appliances, etc.

NEW TOOL COMPANY FORMED

KENOSHA, WIS., March 19—The Holm Mfg. Co. has been organized at Kenosha, Wis., with a capital stock of \$50,000 to manufacture tools, jigs, dies, patterns and special machinery for metalworking. A plant is being equipped and will be ready to commence production about April 15. Officers are: President, J. H. Holm; secretary, H. A. Bowman; general manager, W. C. Holm.

PLAN NEW BATTERY PLANT

PHILADELPHIA, March 19—The Electric Storage Battery Co. is planning the erection of a \$5,000,000 plant on the forty-acre tract at Rising Sun Lane and Adams Avenue.

Municipal Bus Lines Opposed in New York

NEW YORK, March 24—Injunction proceedings have been instituted in the State Supreme court by a taxpayer to restrain the municipal government from operating bus lines in any of the five boroughs. The litigation is stamped by Mayor Hylan as a move by "the traction interests" to choke off competition.

This is the second step in court proceedings to test the validity of the bus business fostered by the city. The first was directed by Federal Judge Mayer under whose direction the receiverships of the New York Railways Company and the Brooklyn Rapid Transit Company are being conducted. He has ordered that suits be started to determine the legality of privately owned lines operating in the streets in opposition to street cars. The buses now in use, excepting those of the Fifth Avenue Coach Company, are running without franchise or the sanction of the Public Service Commission.

Meanwhile the Board of Estimate has authorized the issuance of \$1,140,000 in tax notes for the construction of 200 motor buses to be operated by the city. Plans prepared for the buses by Grover A. Whalen, commissioner of plant and structures, call for vehicles seating thirty persons with standing room for as many more. Seats are to be 24 in. wide.

The steps leading to the interior will be of the collapsible type and will be operated by the chauffeur. Six of the seats will face forward and a semi-circle of seats in the center will accommodate ten passengers.

PICK ELECTS OFFICERS

WEST BEND, WIS., March 22—The Carl Pick Co. of West Bend, Wis., a new \$75,000 corporation organized to manufacture universal joints and other automotive parts, has elected the following officers: President, Carl Pick; vice-president, S. F. Mayer; secretary and treasurer, Carl B. Rix; directors, J. F. Huber and A. J. Langenbach. A plant is being prepared to begin production about May 1.

WHITMAN-BARNES ELECTS

AKRON, OHIO, March 22—Officers of the Whitman & Barnes Manufacturing Co. elected at the recent annual meeting are: A. D. Armitage, president; W. H. Eager, A. B. Hall, and W. J. Elliott, vice-presidents; E. A. Fisher, treasurer; W. E. Rowell, secretary, and S. H. Tuttle, assistant secretary. Elliott formerly was manager of the St. Catharines factory. He will now have charge of the entire Canadian division.

MEREDITH JOINS SAXON

DETROIT, March 19.—H. P. Meredith, formerly in charge of plant extension for the Cadillac Motor Car Co., has been made manufacturing manager of Saxon Motor Car Co. He was instrumental in bringing about the abandonment of the present Cadillac plant for the new one under construction.

Men of the Industry Changes in Personnel and Position

Paul E. Ryan has been appointed manager of the Perfection Spring Co. division of the Standard Parts Co., to succeed J. B. Childe, resigned.

I. B. Meers has been appointed western salesmanager of the Lewis-Hall Motor Corp. His headquarters will be in San Francisco.

Charles E. Wellman has joined the staff of the motor truck department of the Franklin Automobile Co., as designing draftsman.

C. H. La France, of the sales department of the Franklin Automobile Co., has been appointed general manager of the Franklin Products, Inc.

Joseph M. Lake has been appointed general salesmanager of the Sanford Motor Truck Co., Syracuse, N. Y., and C. F. Doty, special representative.

H. H. Hardy, manager of the American Railway Express Co., in Lansing, will have charge of the purchasing department in the high speed limited truck division of the Duplex Truck Co.

C. Martin Kolbenstetter, sales manager and director of the Kol-Ben Wheel Co., and Otis C. Curry, factory superintendent, have severed connections with the company.

E. B. Knowles, for the past fifteen years associated with the brake lining business, recently has become secretary and general manager of the Staybestos Manufacturing Co.

E. F. Paeppe, formerly chief engineer of the Republic Motor Truck Co. and the All-American Truck Co., is now chief engineer of the Superior Motor Truck Co. of Atlanta.

W. E. Finkbeiner, consulting engineer, has been engaged by the Production Engineering Co. of 212 Center street, New York.

A. C. Rice, sales manager of the Cycle-motor Corp., Rochester, N. Y., has been appointed vice-president in charge of sales.

Charles A. Tucker has been appointed general sales manager of the Olds Motor Works and will immediately assume the duties of his new position. He succeeds P. L. Emerson, resigned.

S. K. Miller has been promoted to the position of vice-president of the Kentucky Wagon Manufacturing Co. He will retain his place as the head of the sales organization.

H. H. Biggert has been made a vice-president of the Emerson-Brantingham Co., and will have charge of production in the eight E-B factories.

John W. Clerke has joined the engineering staff of Brewster & Co., Long Island City.

N. I. & V. A. Approves Standard Belt Speeds

CHICAGO, March 24—Belt speeds of 1500, 2600, 3000, 3250 and 3500 feet per minute, which previously had been adopted by several departments of the National Implement and Vehicle Association, have been approved by the executive committee of the association. These speeds are now being voted upon by the American Society of Agricultural Engineers. Inasmuch as these speeds have been recommended by the agricultural equipment standards committee, formal approval by the A. S. A. E. will result in the acceptance of these speeds as standards for the industry.

The executive committee also has approved the recommendations of the tractor and thresher department of the N. I. & V. A. for standard tractor and plow hitches which likewise have been approved by the agricultural equipment standards committee and referred to the various organizations represented on this committee for their acceptance as an agricultural equipment standard. These hitches are:

Vertical hitch, 13 in. to 18 in.

Lateral adjustment, 2-bottom tractor, maximum, 28 in.

Lateral adjustment, 3-bottom tractor, maximum, 32 in.

Lateral adjustment, 4-bottom tractor, maximum, 40 in.

They should be so designed that lateral adjustment on a 2-bottom plow will fall within the distance of 28 in. from the furrow wall; on a 3-bottom plow, 32 in., and on a 4-bottom plow, 40 in.

In approving these hitches the executive committee took the position:

"That in the passage of this standard it is understood that where the wheel of the tractor runs in the furrow that the height must be greater than where the wheel runs on the unplowed land and where said wheel does run in the furrow that the latitude of 13 in. to 18 in. is to be measured from the surface of the unplowed land to the drawbar.

"The large latitude in vertical hitch from 13 in. to 18 in. is also made necessary by the difference in size and weight between the smaller 2- and 3-bottom plows and those of 4 bottoms or larger. Therefore the hitch can be higher for such rigs and afford a greater road clearance."

PACKARD GRADS GET WATCHES

DETROIT, March 19.—Packard Motor Car Co., has graduated 281 members of the "class of 1919." Each of the members of the class, all of whom have seen ten years service in the Packard employ, was presented with a gold watch by president Alvin Macauley. A vaudeville entertainment and an address by H. H. Vandenberg, editor of the *Grand Rapids Herald*, featured the presentation exercises.

GOES WITH ARMORCORD

MORGANTOWN, W. VA., March 19.—The Armorcord Rubber Co. has secured the services of Cody Resseger, of the Mill Rubber Co., Akron, Ohio.

Calendar

SHOWS

April 21-28—San Francisco, National Aeronautic Exposition, Exposition Auditorium.
Oct. 6-16—New York, Electrical Show, Grand Central Palace. George F. Parker, Manager.

FOREIGN SHOWS

April 3-May 4—Buenos Aires, Exposition of U. S. manufacturers.
May 15-June 13—Cars, Parts and Accessories, Antwerp.
June 26-July 25—Commercial vehicles, tractors, camions and engines, Antwerp.
July 9-20—London, England, International Aircraft Exhibition, Olympia. The Society of British Aircraft Constructors.
Aug. 7-Sept. 15—Motorcycles, sidecars, etc. Antwerp.
October—London, Commercial Vehicle Show, Olympia.
November—London, Passenger Car Show, Olympia.

CONTESTS

May 1—Hanford, Cal. Dirt track.
May 31—Indianapolis, Ind. Speedway.
May 31—Brockport, N. Y. Dirt track.
June 1—Omaha, Neb. Truck Reliability Run.
June 12—Uniontown, Pa. Speedway.
June 17—Portland, Ore. Dirt track.
June 19—Ogdensburg, N. Y. Dirt track.
July 4—Tacoma, Wash. Speedway.
July 4—Hanford, Cal. Dirt track.
July 4—Spokane, Wash. Dirt track.
July 5—Batavia, N. Y. Dirt track.
July 17—Warren, Pa. Dirt track.
July 24—Watertown, N. Y. Dirt track.
July 31—Fulton, N. Y. Dirt track.
Aug. 7—Erie, Pa. Dirt track.
Aug. 14—Buffalo, N. Y. Dirt track.
Aug. 21—Johnstown City, Pa. Dirt track.
Aug. 28—Canandaigua, N. Y. Dirt track.
Aug. 20-21—Middletown, N. Y. Dirt track.
Aug. 27-8—Flemington, N. J. Dirt track.
August, 1920—Paris, France, Grand Prix Race, Sporting Commission Automobile Club of France.
Sept. 1—Glidden Tour—N. Y. to San Francisco.
Sept. 6—Hornell, N. Y. Dirt track.
Sept. 6—Cincinnati, O. Speedway.
Sept. 6—Uniontown, Pa. Speedway.
Sept. 17-18—Syracuse, N. Y. Dirt track.
Sept. 25—Allentown, Pa. Dirt track.

Oct. 1-2—Trenton, N. J. Dirt track.
Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

April 27-29—Atlantic City, Increased Production Convention, Chamber of Commerce of the United States.
May 9-12—Independent American Petroleum Congress, Congress Hotel, Chicago.
May 12-15, 1920—San Francisco, Seventh National Foreign Trade Convention.
June 22-25—Asbury Park, N. J. Annual meeting American Society for Testing Materials.
S. A. E. MEETINGS
April 7—Minneapolis Section Meeting, Subject—Tractor Weight and Drawbar Pulls.
April 8—Metropolitan Section, Automobile Club of America, New York. Subject—A Study of Tire Deflection and Unsprung Weight in Trucks. Speaker, A. F. Masury. Illustrated.

LaFayette to Build Homes for Employees

INDIANAPOLIS, March 24—Development of an independent community adjacent to its plant at Mars Hill, four and a half miles from the center of the city, has been begun by the LaFayette Motors Company. A homes building company has been incorporated with a capitalization of \$1,000,000 and already has started the construction of 200 modern dwellings to assist in housing the skilled labor required in the production of the new LaFayette car.

There already is a small community in the vicinity of the plant, but the new development is designed to care for the rapid increase in population which is inevitable. A wooded ridge of 110 acres five blocks from the factory has been selected as the residential center of Mars Hill. No two of the new houses will be exactly alike. They will be served by a business district with stores, bank, hotel, garage and motion picture theater. A modern grade school will be erected and a large park and playground are other community advantages proposed.

The houses will be sold to LaFayette employees at cost with a payment down and monthly installments which range from \$20 to \$75. Buildings of a special fireproof concrete type will be favored. Each house will have sewer connections, furnace, electric lights and gas.

SASKATCHEWAN CARS GAIN

WASHINGTON, March 19—Saskatchewan has more motor vehicles than any other Canadian province, according to a recent commerce report.

During 1919 there were 58,811 licenses issued, as compared to 50,671 in 1918. Licenses for private automobiles numbered 54,801; auto livery, 1584; dealers' cars, 944; chauffeurs, 852; garage cars, 190, and motorcycles 450. There was a decrease of 185 in the number of motorcycles as compared with 1918.

La France to Build Trucks in New Plant

ELMIRA, N. Y., March 19.—The American La France Fire Engine Co., builders of fire department apparatus, is completing its first series of motor trucks in its plant at Elmira. These types include the following sizes: 5, 3½, 2½ and 1½ tons.

The company has acquired a tract of more than 23 acres in Bloomfield, N. J., near Newark, on which a plant is being erected. Operation is expected to begin there this summer. The company has branch salesrooms and service stations in Boston, New York, Philadelphia, Atlanta, Pittsburgh, Dallas, Chicago, Minneapolis, Denver, San Francisco, Los Angeles, Portland, Ore., and Toronto, Canada. It is proposed to carry a full stock of commercial truck parts.

PAIGE PRICES INCREASE

DETROIT, March 19.—Following are new prices of Paige models which became effective March 9:

6-42 Glenbrook five-passenger touring, \$1,770; 6-42 light six coupe, \$2,495; 6-42 five-passenger sedan, \$2,595; 6-55 Essex five-passenger touring, \$2,400; 6-55 Larchmont, \$2,500; 6-55 five-passenger coupe, \$3,260; 6-55 seven-passenger sedan, \$3,360.

Accessory Association Seeks New Members

A nation-wide campaign to increase the membership of the Motor and Accessory Manufacturers' Association has just been launched.

More than 300 representative manufacturers of parts and accessories for the automotive industries are now members of the association and it is hoped to add to this group a large percentage of the eligible companies who are not yet affiliated.

"The association," says M. L. Hemmings, general manager, in his announcement, "has behind it a sixteen year record of constructive achievements for the good of the entire industry. Within the last year or so its scope has been enlarged and its services and advantages multiplied to the point where we believe it practically essential for every forward-looking manufacturer in the industry to become affiliated."

RELIANCE WHEEL TO BUILD

YOUNGSTOWN, March 19.—The Reliance Wheel Co., manufacturer of pressed steel double disk wheels, has adopted an extensive program providing for greatly increased production on the erection of a new plant on thirty acres recently acquired here, the first unit of which will be under construction within a short time.

To meet this extension the stockholders, at a recent meeting, voted to increase the capital stock to 25,000 shares, no par value, common stock, \$500,000, at 8 per cent cumulative preferred.